PULSE CHECK
ON DIGITAL LEARNING

unicef | for every child

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FOREWORD

Amid the global learning crisis and the COVID-19 pandemic, technology-enabled remote learning became a lifeline for many children and young people. However, the large disparities between and within countries magnified the need for a reexamination of education systems to be more inclusive, equitable, engaging and learner-centered. In response to the crisis, the Transforming Education Summit (TES) 2022 was convened at the United Nations General Assembly to address this need and transform education systems.

Nearly 90% out of 133 National Statements of Commitment made at TES highlighted digital learning with more than one-third expressing ambitions to strengthen, create or extend open, free, and curriculum-aligned digital learning content and platforms, with offline resources prioritized in low-resource contexts.

With the goal of reimagining education and ensuring every child is offered personalized learning through world-class digital learning solutions, UNICEF is at the forefront of equitable approaches to edtech efforts. This includes the most recent multi-partner initiative launched at TES by UNICEF and UNESCO – Gateways to Public Digital Learning – to create and strengthen inclusive digital learning platforms and content.

A holistic approach is required to achieve true digital transformation. Building on lessons learned from the COVID-19 education response globally, the following five key vitals of digital learning require urgent action:

1. The importance of **ICT in Education policies and financing**
2. The value of availability and usability of **digital learning platforms and content**
3. The key role of **teachers and school leadership**
4. The need to build **digital literacy** across all groups
5. The necessity of **holistic learning opportunities** within and beyond classrooms

We have witnessed great strides, ingenuity, achievements, reassessment of priorities, and innovative partnerships across all countries. We must not repeat the same mistakes, and instead, build on the lessons learned. Checking the pulse is an important step in that direction. The vitals and recommendations can provide a way forward that is coherent, focused and collaborative, so that digital learning can truly be a public good, and all children and young people can be empowered to succeed in school, work and life.

Robert Jenkins, Ed.D,
Director, Education and Adolescent Development, UNICEF

CONTENTS

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EXECUTIVE SUMMARY

This report aims to **take the pulse** of each vital element of digital learning and **offer steps to recovery** through child-centered, equity-driven and innovative solutions, particularly as technologies and digital learning have come center stage since COVID-19. It is also part of UNICEF's larger efforts to provide quality, personalized and safe learning experiences to all children, ensure learning and skills development, close the digital divide and spearhead innovative and scalable solutions to educational challenges.

The five interlinked vitals for effective digital learning proposed in this brief are: **1) ICT in Education policies and financing, 2) digital learning platforms and content, 3) teachers and school leadership, 4) digital literacy, and 5) holistic learning opportunities within and beyond classrooms,** which aim to provide a starting point to transforming education systems and ensuring effective digital learning experiences. In view of these vitals, this brief calls primarily on policymakers, but also private sector partners, research agencies, and international and local organizations, as well as civil society, to prioritize the following actions:

1 Ensure a whole-of-system approach to digital learning through national ICT in Education policies and Master Plans, as well as cross-sectoral partnerships.

Countries with established and up-to-date ICT in Education policies and Master Plans were better equipped to respond to the COVID-19 pandemic and its effects, ensuring

resilience and readiness to global changes and crises. In order to build robust and effective education systems, government entities and key partners across various sectors, including education, telecommunication, finance and others, must come together to plan and develop ICT in Education policies and Master Plans that are properly budgeted and preferably implemented by dedicated national educational technology agencies, in coordination with the Ministries of Education and those in charge of ICT and Telecommunications.

2 Increase resources dedicated to digital learning.

UNICEF has estimated that a minimum of $1.4 trillion in funding is needed by 2030 to cover spending related to digital learning. To be edtech ready, countries need multisectoral investment in not only electricity, infrastructure, devices, data and connectivity, but also educational content, teacher training, broader capacity development across the education sector, and data and research. This can be achieved by standardizing the tracking of edtech investments and channeling financial instruments towards edtech development, with consideration of the needs and realities of marginalized children and youth from low-income families, alongside scalability and sustainability.

3 Address the digital and usage divides.

During the COVID-19 pandemic, hundreds of millions of learners were not able to access digital learning content and platforms and receive remote support from their teachers due to the digital and also usage divides, both of which must be urgently addressed. Findings from a recent mapping of national digital learning platforms from over 180 countries show that progress on digital learning platforms has stalled or even backtracked in many countries, and offline functionalities, accessibility features, and basic interactivity are sorely lacking. It is therefore essential to put in place equity and quality assurance mechanisms for digital learning platforms and content. Ensuring that support systems for caregivers, teachers and students are also in place can help guarantee that resources are accessible and used effectively. Finally, a balance must be struck between provision of high quality content and optimization for low connectivity settings.

4 Support, train and empower teachers and school leaders.

Teachers' capacity was one of the biggest barriers in shifting to remote learning during the pandemic, flagging a gap that needs to be urgently addressed. School leaders have been overlooked and undervalued. To address system-wide issues around teachers' capacity, promotion and career pathways, ICT competency standards for teachers should be developed and implemented, relevant to the countries' realities and needs, accompanied by pre- and in-service teacher training, pedagogical coaching, and other support mechanisms, with a focus on effective pedagogy in utilizing technologies in the teaching and learning process. Support to school leaders, national standards and clear career pathways is also key, together with training opportunities and guidance, particularly related to technology integration, digital skills, remote learning and instructional leadership practices, among others.

5 Foster development of digital literacy for all learners, teachers and caregivers to enable digital learning and the development of the full range of skills, and to support success in school, work, and life.

According to UNICEF and the Education Commission, 68% of youth are not on track to develop digital skills, with large disparities between high- and low-income countries, and gender gaps favouring boys. While integration of computer science in curricula is an important way to build learners' digital literacy, children in low-income countries are less likely to have access to these courses than their peers in high-income countries. Digital literacy frameworks should be developed and integrated within national curricula, and teachers must be supported to develop their own digital literacy and leverage technology in sound pedagogical approaches. Parents and caregivers should be provided with opportunities to build their digital literacy so they can support their children's learning and safety online.

6 Meet children where they are.

Remote learning during COVID-19 has led to a greater reliance on technology for children and youth, as well as teachers and caregivers, to learn, seek information, engage with others, find entertainment and play. It has become

evident that learning can happen not just through explicitly educational apps and software, but also through social media and games. When carefully planned and facilitated by teachers, caregivers and communities, edutainment (or "entertainment education") can improve knowledge and skills, increase motivation and engagement, reach children where they are, and complement other learning approaches.

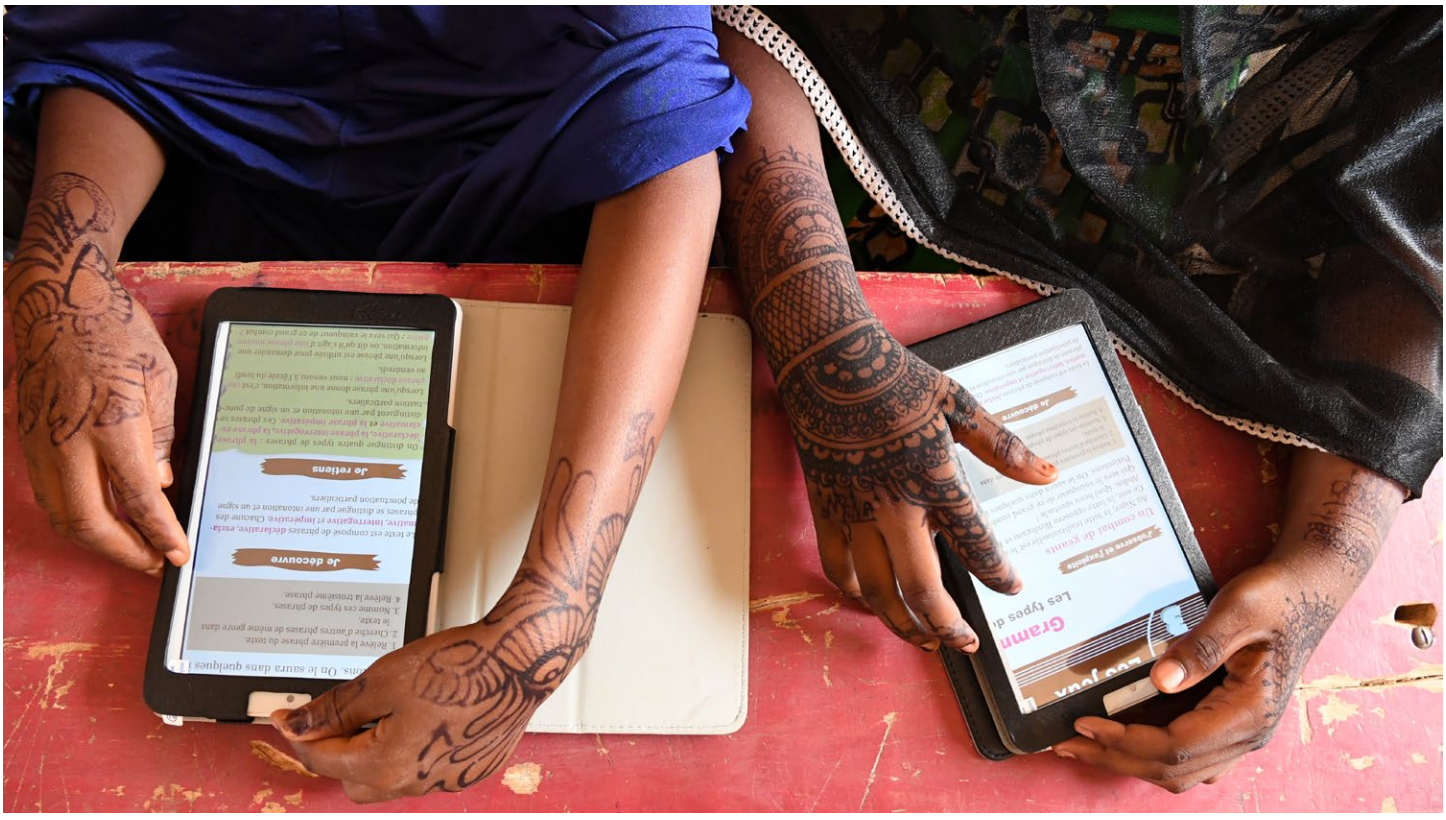
Some of the additional recurring themes highlighted throughout this brief:

- There is still a great **lack of data, evidence, and monitoring and evaluation (M&E)** across each vital element, creating a blind spot around key areas that require urgent attention and action, and a significant barrier to further investigation, policy changes, financing and interventions. While this brief consolidates some of the available data and research available, the findings still only scratch the surface.

- To achieve **true digital transformation**, we must look beyond singular elements, such as electricity, connectivity, devices or infrastructure. Without a holistic approach that considers policy development and implementation, quality content and digital learning platforms, teacher training, digital literacy and more, the effectiveness and impact of edtech efforts can only go so far.

- **Marginalized learners and low-income families,** particularly in low- and lower-middle income countries, **must be at the center** of digital learning policies, decision-making processes, initiatives, platforms and engagement. Without appropriate consideration of these groups, the potential for digital learning remains minimal.

Most importantly, these efforts require a **broader transformative approach to education** to avoid replicating outdated and obsolete models of teaching and learning, even with the use of technologies. The persistent and deeply rooted issues discussed require immediate attention and consolidated efforts through targeted and innovative reforms and human-centered technologies, as well as coherence among all stakeholders. The resultant healthy and revitalized education systems and overall empowering environments can support the children and youth of today to become the change agents of tomorrow.



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INTRODUCTION

The onset of COVID-19 and its colossal impact on education, teaching and learning has magnified the need for a **rehaul and transformation of education systems globally**. With only a third of 10-year-olds able to read and understand a simple text,[1] it has never before been so critical to reconsider the effectiveness, quality and equity dimensions of learning provision to children. Reflecting on the global crisis, the Vision Statement of the UN Secretary-General on Transforming Education[2] states:

To make matters worse, the pandemic's negative effects on education have been disproportionate in **low- and lower-middle-income countries**.[3] In recognition of the digital divide, many countries deployed a mix of remote learning modalities during mass school closures including printed kits, TV, radio, and mobile and digital platforms. One important lesson learned, mirroring the many pre-COVID-19 experiences with digital learning,[4] is that strategies which do not sufficiently consider the human element are bound to fail. As a result, there is a **larger digital and skills divide than ever before**.[5]

> **Education systems are no longer fit for purpose. Young people and adults alike report that education does not equip them with the knowledge, experience, skills, or values needed to thrive in a rapidly changing world. Learning continues to underplay skills, including problem solving, critical thinking and empathy. Employers complain of a major skills mismatch while many adults are left with little or no access to affordable training and re-skilling opportunities. Teachers are often poorly trained, undervalued, and underpaid, and are held back by outdated roles, methods, and tools of instruction. Parents and families decry the value or lack of return on the investments they make in education and their children.**

Some of the **common global gaps and subsequent responses** to COVID-19 included prioritization of long- and short-term strategies and policies for technology-enabled learning, as well as development of digital learning content and platforms. More than ever, teachers and schools were the main gatekeepers of continued learning, having to adjust and learn "on the job". At the same time, digital literacy became a prominent concern among all groups, from children, youth and teachers to parents, caregivers and other stakeholders. Finally, the shift from physical to virtual or technology-enabled classrooms highlighted the new realities and the interlinked environments in which children learn, interact and play.

Prior to and during COVID-19, UNICEF has been at the forefront of reaching children and youth in greatest need in over 190 countries.[6] As part of its efforts, it has been a top priority for UNICEF to reimagine education and realize the largely untapped potential of technology's role in low- and middle-income countries to combat the learning crisis and enable children everywhere to be empowered individuals. This tremendous effort, however, cannot achieve results in a silo. With 2.9 billion people still offline (in 2021), UNICEF and ITU have joined efforts to connect every school in the world to the Internet by 2030 as part of the **Giga initiative**,[7] which has already helped over one million students and 3,200 schools get access to the Internet.[8] In tandem, during the Transforming Education Summit 2022,[9] UNICEF and UNESCO launched **Gateways to Public Digital Learning**,[10] **a multi-partner initiative** that aims **to create and strengthen inclusive digital learning platforms and content**. It will map and analyze existing public platforms and content; help countries create and strengthen national platforms; identify and share best practices; and establish international norms and standards to guide the development of platforms in ways that advance national and international goals for education.

Aligned with commitments made at the Transforming Education Summit and UNICEF's priority areas, reflective of the learnings from COVID-19 responses, and with an effort to look to the future, this brief proposes five interconnected vitals of digital learning: **ICT in Education policies and financing, digital learning platforms and content, teachers and school leadership, digital literacy, and holistic learning opportunities within and beyond classrooms**. These vitals are not meant to present a comprehensive or blanket list of the only elements that are required for effective digital learning, but rather offer a bird's eye view of key elements that will be required to make digital learning effective and education systems resilient and more agile going forward. Since the discussion of each of the vitals requires data and up-to-date research, availability of such was also a factor, as these are still greatly lacking. Last but not least, this brief is meant to build on and echo the latest report by UNICEF and the Education Commission, "Recovering Learning: Are children and youth on track to skills development?".

The **digital divide** is a cross-cutting issue that pertains to each vital discussed, and for that reason there is no explicit vital that addresses it. The urgent need for electricity, devices, infrastructure and connectivity are approached as the bedrocks and absolute essentials to technology-enabled societies and education. However, programmes or policies must avoid focusing only on the provision of technologies and connectivity, assuming these are sufficient for effective digital teaching and learning experiences. Therefore this brief is primarily focused on the **overall ecosystem** for **quality digital learning** and strives to ensure that in addition to and beyond the aforementioned essentials, the proposed vitals are thoughtfully considered and planned out. All of these are critical components to holistic digital transformation.

As highlighted by UNICEF Executive Director Catherine Russell during the recent Transforming Education Summit, **digital education should be and is a public good**. The global community needs to invest more in partnerships, innovation, equitable digital learning opportunities and generation of evidence. It is hoped that this brief will contribute to a better understanding and recognition of the highlighted themes around the vitals of digital learning, teaching and engaging, and help sustain the momentum achieved through the lessons learned from the COVID-19 pandemic.

VITAL COMPONENT 1: ICT IN EDUCATION POLICIES & FINANCING

By Haogen Yao, Auken Tungatarova and Patrick Walugembe

PULSE CHECK

1

The COVID-19 pandemic exposed both a **lack of readiness and a clear vision for digital and remote learning** across the globe.[11] This was evident through the absence or shortage of appropriate infrastructure, connectivity, policies and programmes, digital learning solutions, educational content and resources, and guidance and support mechanisms for schools, teachers and families, as well as the lack of digital skills among students, teachers and caregivers. Even in technologically advanced countries, teachers could not cope with the sudden demand and need for online and remote learning modalities, leaving at least 31% of school age children without access to such opportunities.[12] The situation has been even more grave for girls, children with disabilities, children living in rural and remote areas, children in emergency contexts and ethno-linguistic minorities.

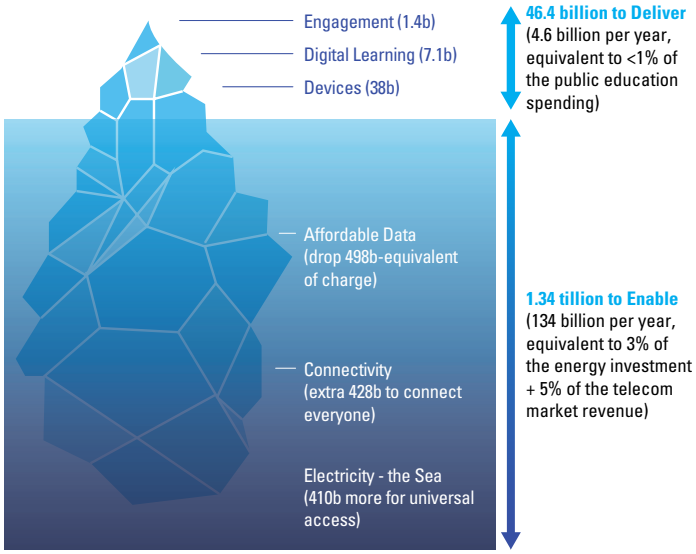
Digital learning was underfunded prior to the pandemic, and an analysis of the present fiscal space provides an even grimmer picture. **National education budgets**, among other sectoral budgets, **have been constrained**, where

"40 percent of poorer countries did not provide specific support for disadvantaged learning during the COVID-19 crisis."[13] In fact, both domestic and international assistance for education has declined in share globally, and only 3% of COVID-19 stimulus packages were directed towards education.[14] According to the 4th round of the Survey on National Education Responses to COVID-19 School Closures, less than half of low- and lower-middle-income countries increased their budgets for primary to upper secondary education in 2021, as compared to over 90% of high-income countries and 83% of upper-middle-income countries.[15] On the one hand there is an increasing realization of the potential for technologies to provide continued and equitable learning opportunities, improve learning outcomes, and transform both education systems and the quality of learning experiences. On the other hand, "**the perception of urgency appears to have diminished** despite the persistent need to address the digital divide and learning losses."[16]

According to UNICEF estimates, and as illustrated in Figure 1, to cover all spending related to digital learning, **a minimum of $1.4 trillion in funding is needed by 2030**.[17] This number is inclusive of the enabling conditions that would be financed by non-education sectors, mainly electricity, Internet connectivity and affordable data. For **digital learning**, which encompasses the costs of content, teacher training, developing capacity, and supporting data and research, at least **$7.1 billion** is needed by 2030, with the largest amount (an estimated $3.1 billion) required for upskilling teachers and facilitators. $7.1 billion is a seemingly insignificant figure compared to $1.4 trillion, yet it plays the most critical role in the sustainable promotion of effective digital learning. Previous digital learning studies have repeatedly confirmed that the **soft components of digital learning** (e.g., improvement in instruction) are much more effective in raising learning outcomes when compared to solely the provision of facilities and devices.[18]

In agreement with the need to consider and plan the entire edtech ecosystem, and to ensure coordinated mobilization, management and sustainability of funding resources for digital learning, **national ICT in Education policies and Master Plans** are the main vehicles to achieving this. Such policies and Master Plans can and should also prioritize equity, inclusion and gender equality to address the pervasive digital divides.[19] Apropos, countries with established ICT in Education Master Plans were better equipped to respond to the COVID-19 pandemic and its

FIGURE 1. Items to be costed for the universalization of digital learning



effects due to their advanced preparations and readiness for large-scale remote learning.[20]

For example, **Singapore** has built on decades of developing and reviewing its Master Plans. Its first, in 1997, laid the foundation for harnessing ICT and developing teachers' digital competencies, and its current plan aims to create a technology-enriched school environment that is responsive and agile to change.[21] To make this vision a reality, teachers have been entitled to 100 hours of professional learning per year to continuously enhance their skills, including digital skills.[22]

Plan Ceibal, **Uruguay's** National Digital Education Plan developed in 2007, allowed Ceibal en casa (Ceibal at Home) to be launched as soon as schools closed, offering digital platforms and services for teachers, students and families for distance learning, since devices, Internet at schools, pedagogical services, digital educational content, platforms, and resources had already been systematically deployed.[23]

In **India**, aligned with the National Education Policy 2020,[24] and based on the need for a "stable, yet evolving framework for digital infrastructure" following COVID-19, the Government launched NDEAR (National Digital Education Architecture) with a vision to "energize and catalyze the digital education ecosystem to create and deliver diverse, relevant, contextual, innovative solutions that benefit

students, teachers, parents, communities, administrators resulting in timely implementation of policy goals."[25] It arose from the need for more agile, resilient, and decentralized systems, and a more holistic approach to providing choices and solutions to end-users.

DATA GAPS AND THE POTENTIAL FOR FUTURE RESEARCH

- While there are well-known examples of national edtech policies and Master Plans, there is a lack **of up-to-date global studies, mapping** and an inventory of national ICT in Education Policies and Master Plans that have been developed and implemented as well as of national educational technology agencies, particularly in low- and lower-middle-income countries. The availability of such a mapping (even initial) could provide data points and telling information on edtech policy environments, coordination mechanisms, financing and partnership approaches, trends, limitations, bottlenecks, successes and lessons learned.
- For low- and lower-middle-income countries which rely (relatively) substantively on aid, there is also a **lack of mechanisms to track the funding for digital transformation in education**. For example, while there are already **specific markers**[26] to track official development aid for emerging topics such as climate change and biodiversity, there is none for digitization.

WHAT NEEDS TO BE DONE?

In line with the Call to Action by the Transforming Education Summit[27] and under the 'adequacy – efficiency – equity' framework in education financing,[28] the following recommendations are proposed to 'activate the pulse':

Increase the resources available for digital learning with appropriate monitoring.

- Facilitate standardized **tracking** of edtech investments, including establishing markers for digital learning in government budget plans and developmental/humanitarian aid, so baselines and benchmarks can be generated based on countries' contexts.
- **Channel existing and emerging financing instruments** toward edtech development.[29] While public spending remains the major source of edtech investment, we need to advocate the earmarking of global funds and financing mechanisms, as well as practice innovative financing for digital learning, including bold, new and more "digital" attempts.[30]

Promote efficiency and effectiveness of education systems through implemented policies and partnerships.

- To properly plan for and distribute finances and resources, as well as ensure efficiency and effectiveness, **formulate and implement ICT in Education policies and Master Plans** aligned with national priorities that allow for infrastructure and connectivity as well as wider ecosystem planning. Such policies and Master Plans can have a tangible, long-term impact, and provide resilience measures to prepare for future pandemics or climate change crises. These should be "accompanied by a costing exercise and a **budget for implementation**" (including the total cost of ownership), and preferably be **led or supported by dedicated institutions** such as national educational technology agencies (in coordination with key Ministries, such as Ministries of Education and those in charge of ICT or Telecommunications) to ensure oversight, implementation and scale.[31] It is also essential that **M&E mechanisms and evaluation** be put in place to continuously reflect on lessons learned and improve.
- Engage and strengthen **partnerships** among governments, education stakeholders, international agencies, and the wider edtech community (e.g., the telecommunication industry and IT companies) in improving operational capacity and in planning, implementing, evaluating and scaling up effective and sustainable digital learning programmes.

Ensure equity in spending.

- **Prioritize marginalized children** through pro-poor budgeting as well as within ICT in Education policies and programmes. These include national development and purchasing of inclusive learning platforms, transferring the Universal Service Fund tax (collected from providers of telecommunications services) to school connectivity in rural, remote and other unconnected areas.

- Consolidate digital learning interventions that are accessed by all, but most importantly **low-income families**, such as low-cost digital learning solutions, zero rating of learning-related Internet data usage, training of teachers, caregivers and others on tech-enabled learning, etc.

Building **robust education systems** that harness the potential of technology takes time; it must **bring a wide range of stakeholders** together, which is not an overnight achievement. It has taken many countries decades to go through several iterations of policies and financing models to achieve the set goals and objectives related to digitization and continuously monitor and reflect on earlier approaches to keep up with educational changes and demands.

The COVID-19 pandemic has presented an opportunity for countries to **re-assess their national programmes**, initiatives, approaches, financing and strategies, and pave the way for more consolidated, holistic, inclusive and forward-looking ICT in Education policies and Master Plans that can ensure that digital innovation and technology-enabled learning are not ad-hoc or only available to the more privileged, but are universally accessible, relevant, effective and conducive to children's learning journeys.

For more information on financing and developing ICT in Education policies and Master Plans, please refer to the list below (not a comprehensive list):

- UNICEF's "How much does universal digital learning cost" (Report Brief and Costing Tool)
- UNESCO's ICT in Education Policy Toolkit
- UNESCO's Guideline for ICT in education policies and masterplans
- The World Bank's "Building and Sustaining National Educational Technology Agencies: Lessons, Models and Case Studies from Around the World."
- The World Bank's Template for costing remote learning encouragement

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VITAL COMPONENT 2: DIGITAL LEARNING PLATFORMS AND CONTENT

By Juan-Pablo Giraldo

PULSE CHECK

2

During COVID-19, Ministries of Education utilized online platforms for remote learning (91%), followed by TV education broadcasts (85%), and take-home packages (82%).[32] However, it was revealed that many countries did not have officially authorized digital learning platforms and content, and many learners do not know where to access digital educational solutions or resources.[33] "In many instances, **content** that does exist has **not been quality assured** […], **is poorly organized, or resides behind paywalls** or in virtual spaces that inappropriately capture and sell student data and expose learners to advertising."[34] Human Rights Watch reviewed over 160 edtech products and found that nearly 90% "engage in data practices that **risked or infringed on children's rights.**"[35]

Among the different technologies used in the education response to the pandemic, basic mobile phones and **basic smartphones were especially instrumental** in enabling continuity of learning and maintaining a channel of communication between students and their teachers.[36] Popular messaging tools such as **WhatsApp** became the "unsung heroes" of continued learning, particularly in low-connectivity settings, with usage growing over 40% during COVID-19.[37] In India alone, similar to findings from other countries, 52% of sampled adolescents reported using WhatsApp for learning.[38] However, while WhatsApp offers opportunities, it also has its own set of limitations and risks, particularly as a long-term solution in education.[39]

To dig deeper and assess how digital learning is experienced globally, UNICEF and EdTech Hub conducted a **mapping of national digital learning platforms from over 180 countries** around the world, examining key areas of availability, accessibility, usability and equity. Most of the findings of this mapping are sobering and demonstrate that **the current digital learning experience is subpar for most learners around the world**:

- **Progress on digital learning made during COVID-19 has stalled and even backtracked in some countries**, as 32% of identified national digital learning platforms no longer exist, have not been updated since 2020 or have links that do not work. This was especially prevalent for platforms developed by countries based in sub-Saharan Africa and South Asia.

- Over 70% of platforms do not offer **offline functionality** (e.g., the option to download videos for offline use, or to use a mobile app while not connected to the Internet). In terms of equity, this functionality is critical with almost half of the world's population still offline.[40] 49% of high-income and 33% of middle-income countries have platforms that offer offline functionality, while only 18% of low-income countries offer the same.

- Only 33% of platforms contained content that a student could interact with, despite **interactivity** being a central component of student-focused learning and a core characteristic of quality of digital learning solutions; most offered only static content such as videos and PDFs of textbooks. Where available, interactive content takes the form of quizzes, comments on videos, forums, and messaging via WhatsApp and chatbots.

- Only 22% of digital learning platforms contained features for **accessibility** to children with disabilities. Further, many of the features observed were rudimentary (e.g. closed captions on videos).

- 65% of the countries surveyed have more than one platform, with implications for the future proliferation of platforms. The two most common types of platforms are: 1) **resource hubs** that collate existing content from other platforms and sources, and 2) **learning management systems** (LMS), such as Moodle or the Learning Passport,[41] with digital courses for various grades and subjects.

- One positive finding is that 85% of platforms were **mobile-friendly** and ran on a basic smartphone; this continues to be a critical factor for digital learning platforms, as mobile phones are the most common device available for digital learning in low- and middle-income countries.

- Another positive finding is that most digital learning platforms (84%) offered features across all the respective countries' **national languages**.

DATA GAPS AND THE POTENTIAL FOR FUTURE RESEARCH:

- This initial mapping provides a first global overview of the status of national digital learning platforms, but **more in-depth studies** are required, focusing, for example, on curriculum coverage, quality, online safety and data protection, as well as consideration of platforms and content at sub-national or more granular levels.

- More research is required on **how platforms and strategies can better engage** teachers, parents and caregivers to support digital learning.

- Additional research needs to explore the **effectiveness of various digital and distance learning modalities and tools**, their complementarity to each other, limitations and opportunities, and innovative features, including a consideration of widely used everyday applications such as WhatsApp, and how these can be effectively leveraged by teachers, learners and families.

WHAT NEEDS TO BE DONE?

While in recent years there has been wide agreement about the importance of connectivity as an enabler of digital learning, a similar consensus needs to be formed around the importance of addressing the gaps **in quality and equity of digital learning platforms and content** currently available to children and young people around the world. Additionally, **teachers and caregivers** must be included in this effort, as they are critical to the success of remote and blended learning approaches yet are often not sufficiently considered in their design and implementation.

This is an **unfinished agenda**. While the digital divide is a critical area of concern that has captured the attention of policymakers, UNICEF's research findings in India, illustrative of a common situation in many other countries, point at a hidden **effective usage divide**, "one which governments can arguably more actively and purposefully bridge, both in the short and longer-term."[42]

There are two major categories of policies and programmes that can address the effective usage divide.

- On the one hand, it is vital to put in place **proper procedures and quality assurance mechanisms** with clear minimum standards to evaluate digital learning content and platforms that are mapped and **aligned with the curriculum** for various subject areas and grade levels, and available in relevant languages (see Annex for UNICEF's 5 characteristics of quality digital learning solutions).
- On the other, **provide training** and support to each stakeholder group so that the content, resources and platforms are effectively utilized and implemented. This support could range from basic digital skills training, parental and caregiver support and nudges, all the way to pedagogical guidance for teachers.

For more information on digital learning platforms and content, please refer to the list below (not a comprehensive list):

- EdTech Hub's Monitoring Distance Education: A brief to support decision-making in Bangladesh and other low- and lower-middle-income countries
- EdTech Hub's SWOT Analysis of the Kenya Education Cloud
- The World Bank's Digital Teaching and Learning Knowledge Pack

Last but not least, even in high-income countries, there needs to be a balance between high quality interactive content and optimization for low connectivity settings,[43] as marginalized students may not have access to curated digital learning content. This can be achieved by allowing for content and platforms to be downloadable and usable offline, with reduced file sizes.

Moving forward, both digital and usage divides must be addressed in parallel, with users placed at the center of digital learning solutions. This can ensure that digital learning platforms and content are relevant, engaging, inclusive, and usable by all.

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VITAL COMPONENT 3: TEACHERS & SCHOOL LEADERSHIP

By Auken Tungatarova and Anusha Ramakrishnan

PULSE CHECK

3

Teachers are the most powerful actors for "equity, access and quality in education, and are key to sustainable development."[44] Indeed, teachers wear many hats, and their role in children's lives, but also in schools, communities and entire societies, is multifaceted, highly influential and in many ways immeasurable.

While the COVID-19 pandemic has shone a light on the essential role that teachers play and the impact that they have, it has also magnified the difficulties, lack of support and training, and overall challenging conditions of the teaching profession.[45] Even in tech-advanced contexts, teachers were largely unprepared for online and distance learning due to the digital divide, but more so because of the **lack of digital competencies**.[46] It quickly became evident that teachers required more support, guidance and training on **digital skills**, but also **pedagogical and assessment skills** "to meet students at their level and to implement accelerated curricula and differentiated learning strategies."[47]

For example, 25% of school leaders reported that **inadequate use of digital technology for teaching** was a hindrance to quality instruction.[48] A 2020 study conducted in Chile, Ecuador, Mexico and Peru assessed teachers' digital skills and readiness for remote learning, finding that 39% of teachers were only able to execute basic tasks, 40% were able to perform basic tasks and use the Internet to browse or send email, and only

13% could do more complex tasks such as navigating various pages and applications.[49] Data from low- and lower-middle-income countries on teachers' ICT skills is not readily available, however, based on statistics from OECD countries—which are, on average, ahead of low- and lower-middle-income countries in educational indicators—it is likely that the average baseline of ICT skills for teachers in those countries is at least similar to, if not worse than, that of OECD countries.

This is not to undervalue the efforts made during COVID-19 to train teachers, as many countries took great leaps to provide ICT training and remedial support. Based on a global survey, over **53% of teachers reported that they participated in a training on using technology tools** and resources for online or remote teaching and learning.[50] Nonetheless, in many cases, while teachers were supported to implement online learning, **teacher training was limited to a few days**. Furthermore, general teacher training trends show that these often **focus primarily on basic ICT skills**, instead of the pedagogical skills required to effectively utilize and integrate technologies and digital tools within teaching and learning processes. Technology-driven trainings and approaches should be replaced by those focused on how technologies can support the various aspects of a teacher's job, pedagogy and learning environments toward their continued growth, innovation and professional development.

These findings are worrying considering that, at the school level, **key factors affecting students' acquisition of digital skills include teacher capacity to use ICT and integrate technology** into the teaching and learning process **and school leadership**. According to the International Computer and Literacy Study (ICILS 2018), the use of ICT by teachers is positively correlated with students' digital skills levels.[51] Teachers' interaction with students also has an impact on children's perception of the quality of distance learning. According to a UNICEF study in India, students rated the quality of their distance learning experience highest when they were in touch with their teachers 4 days or more a week.[52] Likewise, dissatisfaction rates were highest among those who had not been in contact with their teachers. Therefore, if schools wish to best develop their students' digital skills and enable them to access and leverage the power of digital learning, as well as ensure quality learning experiences, they must **invest in ICT training for teachers** that incorporates basic ICT knowledge and skills, pedagogical approaches and other facets of teachers' work, as well as continuous guidance and support.

To address this, UNESCO developed the **ICT Competency Framework for Teachers (ICT-CFT)**,[53] which is intended to inform teacher training policies as well as assist countries in developing national ICT competency standards for teachers. The underlying idea is that teachers who competently use ICT in their professional practice will deliver quality education and ultimately be able to effectively guide the development of students' digital skills.

In addition to national teacher policies, ICT competency standards as well as the necessary training and support, teachers can truly succeed in a positive school environment and under **strong school leadership**. While often overlooked, international evidence shows that school leaders are seen as **critical actors** in the quality and conditions of teaching and learning environments.[54] Despite this evidence, school leaders and principals in many developing countries are often **neglected and underutilized, and receive either no or little training and support**.[55] During the COVID-19 pandemic, school leaders were facing myriad challenges and daunting tasks such as managing school closures and re-openings, facilitating online and distance learning, and ensuring the well-being of teachers, children and parents. Based on survey responses from 3,673 school leaders in 2021, school leaders in lower income countries (LICs) reported higher dropout rates among students and difficulties in reaching them, as well as financial issues.[56] Moreover, in low-income countries and rural schools, three out of four school leaders reported that the majority of their students did not have access to technology.

DATA GAPS AND THE POTENTIAL FOR FUTURE RESEARCH:

- There is a great need for **disaggregated, consistent, ongoing and quality data** and comparative research as to the realities and needs of teachers, as well as evidence of best practices and innovative solutions and approaches, particularly in low- and middle-income countries.
- There is a lack of acknowledgement of the **importance of school leaders** both in the research literature and in practice, and this absence is even more pronounced when it comes to considering their training needs and readiness for tech-based integration and innovation.

WHAT NEEDS TO BE DONE?

- Countries should **develop and implement contextualized and relevant ICT competency standards for teachers** that focus on digital skills as well as, even more importantly, the pedagogical skills that are required for technology integration in learning environments. The implementation of such standards is achieved by integrating these in pre- and in-service teacher training, qualification and certification mechanisms.[57] Such standards should be time-bound, and undergo M&E, reviews and updates to be reflected in subsequent versions.

- As part of the recommendation above, teachers require **continuous, relevant, responsive and engaging support and professional development** programmes on the use of various devices, tools and solutions, digital skills, ICT-pedagogy integration, remote learning modalities and strategies, and formative assessment approaches, as well as hybrid and blended learning.[58] A global review of successful teacher professional development programmes revealed seven features that all such programmes shared. They were all content-focused, incorporated active learning, supported collaboration, used models of effective practice, provided coaching and expert support, offered feedback and reflection, and were of sustained duration.[59] However, teachers' realities, available infrastructure and resources, along with the overall learning environment, must be considered. Monitoring and measuring the impact of teacher professional programmes ensures their quality but also scalability.[60] In addition, pedagogical coaching, learning circles and peer-to-peer support can be useful tools.[61]

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For more information on teachers' digital skills frameworks and professional development, please refer to the list below (not a comprehensive list):

- UNESCO ICT Competency Framework for Teachers (ICT-CST)
- The World Bank's Teachers' Skills and Skills Frameworks for Remote and Blended Learning Knowledge Pack
- The World Bank's Technology for Teacher Professional Development Guide: A Summary of Methods
- EdTech Hub's Technology Use for Teacher Professional Development in Low- and Middle-Income Countries: Recommendations for policy from a systematic review

- It is important to **develop national standards for school leaders**, and outline a **clear career path.**[62] In light of the impact of COVID-19, **capacity building** on remote learning, digital skills and technology-integrated teaching and learning approaches, as well as guidance on "supportive supervision, coaching and instructional leadership practices," should also be ensured so that they can guide the development of a consistent and unified vision, support and empower teachers, and harness the use of technologies and digital learning solutions for school management, teaching and learning.[63]

Teachers and school leaders can be the change agents and champions that take digital learning to the next level, having first-hand understanding of schools' realities, skills, needs, and capacities. As schools and education systems catapult into an ever-changing future with its crises and demands, we need to make sure that teachers and school leaders are equipped with the tools, including digital and pedagogical skills, to be transformative leaders. To put it simply, **if we want strong schools and technology-enabled education systems, we need strong and supported teachers and school leaders.**

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VITAL COMPONENT 4: DIGITAL LITERACY

By Rachel Cooper, Auken Tungatarova and Patrick Walugembe

PULSE CHECK

4

Children and young people need to develop the full range of skills to succeed in school, work, and life. These include foundational skills such as literacy and numeracy, transferable skills, job-specific skills, entrepreneurial skills and digital skills.[64] **Digital skills and literacy are increasingly vital for young people** to succeed in school and beyond and, given their growing importance, are often considered a type of foundational skill. According to one of the proposed working definitions, 'digital literacy' refers to the "**knowledge, skills, and attitudes** that allow children to flourish and thrive in an increasingly global digital world, being both **safe and empowered**, in ways that are appropriate to their age and local cultures and contexts."[65]

Children and young people need to be digitally literate for technology-supported and lifelong learning, safe navigation of the Internet and information, and the demands of the ever-changing world of work. **Teachers** need to be digitally literate to support and guide children's learning, but also to develop professionally, adapt and create learning resources and content, share information and pedagogical approaches, become role models and facilitators of the technology-enriched learning process,

and promote creativity and innovation among learners and within school environments. **Parents and caregivers** need to be digitally literate to support children's technology-supported learning as well as promote the development of digital and other skills.

The World Economic Forum predicts that in the future 9 out of 10 jobs will require digital skills.[66] Yet according to UNICEF and the Education Commission, **68% of youth are not on track to develop the digital skills they need**.[67] Less than a third of youth in Eastern and Southern Africa, West and Central Africa, and South Asia have the digital skills to carry out basic computer-related activities. There are also **gender dimensions to the skills gap** with males 30% more likely than females to be on track to acquire digital skills.[68] In many countries, gendered inequalities mean that more women than men are illiterate or have lower levels of education, and as a result, women often lack the digital skills or confidence needed to use the Internet. This impacts career opportunities for women – globally, women represent less than 26% of ICT professionals.[69]

Available research shows that effective responses to fill the digital skills gap are lacking. For example, there is little effort to formally integrate computer science education into primary and secondary school curricula, as indicated in a Brookings report.[70] The availability of **computer science classes at schools varies**, with greater access in higher-income countries. For learners in countries in Western and Eastern Europe and East Asia, digital skills are taught either through compulsory computer science courses or through cross-curricular integration of computer science in other subjects, while computer science has had limited integration in education systems in Africa and the Middle East.

Several countries offer lessons learned for integrating digital skills into their education systems. When **South Korea** shifted to universal computer science education in 2015, two computer science education expansion policies were implemented, there were several curriculum updates, teacher training was provided, and it was ensured that disadvantaged students are included in computer science education.[71] All schools already had basic ICT infrastructure and connectivity. In 2018, the country placed second out of 12 countries that were part of the 2018 ICILS (International Computer and Information Literacy Study) exam evaluating computer literacy and computational thinking skills.[72]

In **Viet Nam**, UNICEF is providing technical and financial support to the Ministry of Education and Training to establish a digital educational system and develop a 'Transferable Skills and Digital Literacy Framework.' Working together with leading technology companies, academia and youth representatives as part of the next 10-year national education plan and budget, the goal is to reach all 21.2 million children through sustainable nationwide roll-out of digital learning interventions, keeping in mind the special needs of the most vulnerable children including children with disabilities, girls, and ethnic minority boys and girls.

DATA GAPS AND THE POTENTIAL FOR FUTURE RESEARCH:

- Despite the overall awareness of and attention given to the importance and value of digital literacy, more **global, disaggregated and comparative data** is required on children's digital literacy levels and needs. There is a need to know how children engage online, their use of digital technologies, platforms and media, and how this links to development of digital literacy, especially in low- and middle-income countries. Without quality data, the ability to make evidence-based decisions that can guide digital learning policy and programmes at global, regional and national levels may be hindered.
- Data needs to be disaggregated to **account for digital literacy gaps** within populations and between population groups given the disparities faced by marginalized and disadvantaged children and young people – **particularly girls, children with disabilities, and children with limited access to the Internet and devices**. Targeted interventions to close digital literacy gaps – particularly for girls and young women – should be guided by situation analyses and needs assessments, with an understanding of any prevalent cultural and social norms that may determine the level of access to digital technologies and the development of digital literacy.
- Future **research** should critically examine the gaps, how digital literacy is being developed within and outside education systems, barriers to digital literacy development, effective pedagogical approaches, and differentiated approaches to reach all learners.

WHAT NEEDS TO BE DONE?

- Firstly, policymakers should develop or adapt a **digital skills framework** that is relevant and contextualized to countries' specific realities, needs and visions. This can be accompanied by **national skills assessments** to understand any gaps and guide the development of subsequent policies and concrete programmes.[73]

- Secondly, aligned with and as part of implementing national education policies, governments should co-create and integrate ICT/digital literacy within **national school curricula**, listing out the required competencies by grade level and the means of achieving them. This can follow various approaches, such as including digital skills as a cross-cutting theme, or as subject-specific content items. Countries generally embed digital literacy in the domains of both science, technology, engineering and mathematics (STEM), and social sciences (such as humanities and national language).[74] In Estonia, where digital literacy is embedded in over 50% of the curriculum, this is reinforced through a three-pronged approach, including digital literacy as a cross-curricular competence, a cross-curricular theme and a stand-alone subject.

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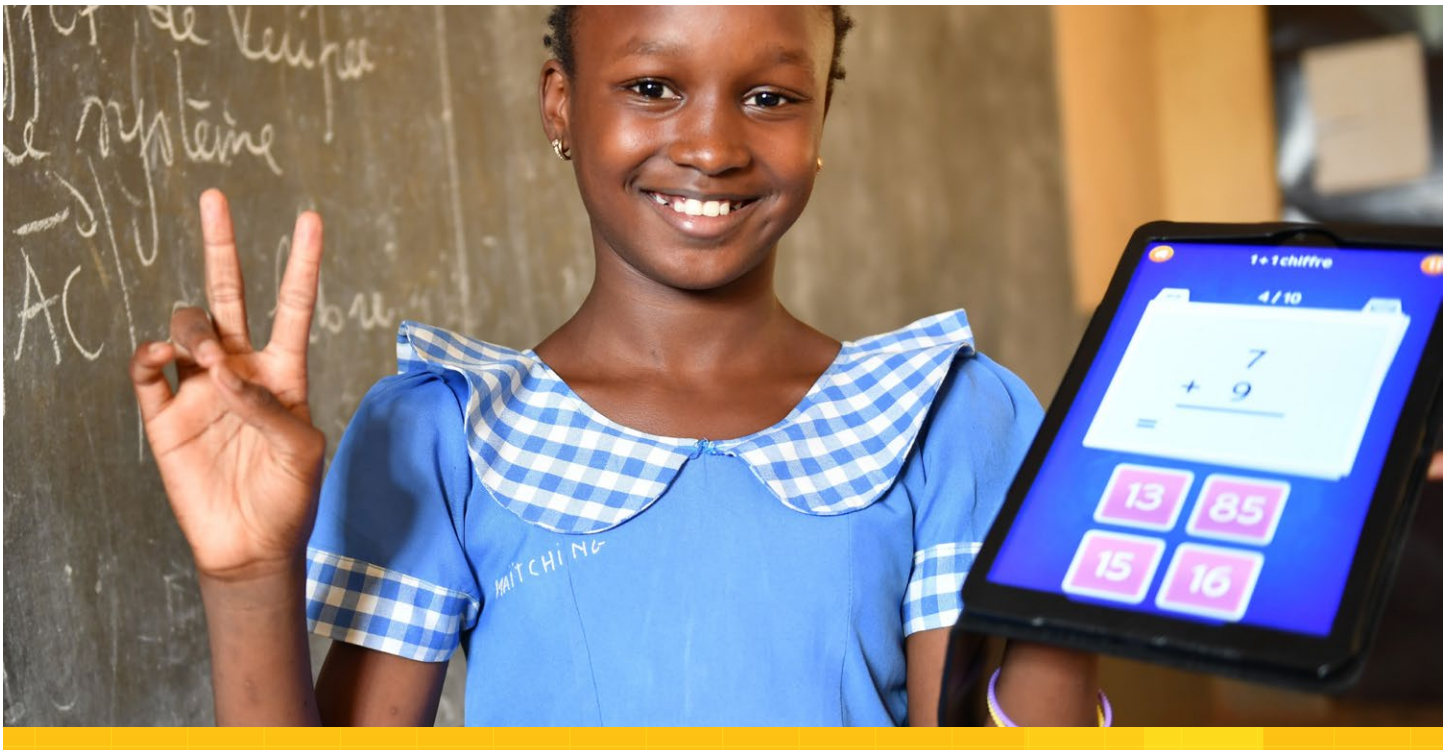
For more information on digital skills frameworks and studies, please refer to the list below (not a comprehensive list):

- A Global Framework of Reference on Digital Literacy Skills for Indicator 4.4.2.
- Digital Competence Framework for Citizens (DigComp)
- Global Kids Online
- EU Kids Online
- Digital Kids Asia-Pacific (DKAP)
- The DQ Institute Digital Intelligence framework
- ITU Digital Skills Toolkit

- In addition to the importance of prioritizing teachers (see Vital 3), the role of **parents and caregivers** is critical. Ensuring that they receive proper information, support, guidance and training around digital skills and literacy (including online safety) would tremendously benefit their children.

- The **equity and inclusion** dimensions of the development of digital skills and literacy must be strengthened by spearheading and enforcing policies, programmes and approaches that work for those who are typically left out of ICT-related fields, computer science classes, as well as learning opportunities or mentoring, such as girls and women.

Overall, UNICEF promotes a **holistic approach to digital literacy** that emphasizes the interconnectedness of traditional and digital literacies, and the importance of children developing the full range of skills. Ensuring that all children and youth, as well as teachers, caretakers and families, possess such skills requires a consolidated effort from all stakeholders and partners.[75] In this increasingly digitized and digitally driven world, digital literacy and skills are essential. Without broad development of digital skills, our future generations will not be able to equitably benefit from opportunities for employment, lifelong learning, participation, creativity and innovation.



VITAL COMPONENT 5: HOLISTIC LEARNING OPPORTUNITIES WITHIN AND BEYOND CLASSROOMS

By Auken Tungatarova

PULSE CHECK

5

As mentioned in Vital Component 4, the full range of skills, including foundational and digital, are essential for work, school and life. Developing such skills, but also continuously reskilling and upskilling, will remain a necessity in the 21st century, where **learning is anything but a linear pathway**.[76] Considering the myriad challenges, requirements and demands children and youth are facing due to health and environmental crises, protracted conflicts and displacement, economic and technological changes, among others, **schools are not the only hubs for learning,** simply because the range of skills and knowledge that needs to be addressed requires great flexibility, innovation and adaptability, which surpasses the current capacity and structures of most education systems.

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Data speaks for itself. At the height of the COVID-19 pandemic, nearly 1.6 billion children, or 94% of the world's student population, were affected due to school closures, with 24 million at risk of never returning to school.[77] Moreover, the **learning poverty rate**[78] has increased from 57% to an estimated 70% as a result of COVID-19 in low- and middle-income countries.[79] **Children have not been acquiring the basic skills**, even when they were attending school.

Since school closures led to children and youth being confined to their home environments, there was greater **reliance on technology**, and a consequent rise in their screen time and exposure to devices, whether low- or high-tech (radio, TV, mobile phones, laptops and online apps and tools).[80] In many ways, technologies, the Internet and digital tools acted as a gateway to learning, but also to the world of play and entertainment, social interactions that children were greatly missing, engagement and creativity.

Today, children in OECD as well as other regions are spending **more time in digital spaces** than ever before using a range of mobile apps, social media platforms, devices and online games from ever earlier ages, within and outside of classrooms, and **for different purposes.**[81] According to the Global Kids Online study in 11 countries[82] between one and two fifths of children use the **Internet to search for information** and look for news, while the most popular online activities include **watching videos or playing games**.[83]

Findings in Cambodia, Indonesia, Malaysia and Thailand echo similar trends, with most children using their mobile or smartphones to play games, watch videos for entertainment or learn new skills, while **managing multiple social media accounts for entertainment, communication and information-searching.**[84] For example, a lot of teenagers in the four countries learned English through social media and language apps, game chats and videos on platforms such as YouTube and Netflix, including those at refugee schools. At a school in Cambodia "children with visual or hearing impairment ... were among the heaviest users of social media, with the highest diversity of app use."[85] At the same time, according to data gathered during COVID-19, this is not the reality for most of the world's children who are **still reliant on TV and radio**, since the Internet remains a privilege for many, particularly the poorer households and those located in remote areas.[86]

This diversity of evidence offers an additional pathway that is often overlooked in educational spaces: If children are indeed engaging with various technologies and the Internet, even more so due to the pandemic, and innovative approaches are needed to ensure continuity of learning at

scale, we need to **look beyond classrooms** and structured learning environments, towards integrating learning within the spaces that attract the most children. While not a panacea, **entertainment-education** (also known as "edutainment") initiatives and programmes that utilize a mix of various technologies and formats, balancing both educational and entertainment content, can help bridge the gap between school and home environments, acting as an additional tool in the educational "toolbox" of policymakers, teachers, caregivers and children themselves. Whether children and youth are listening to radio or TV series, playing video games, or watching videos on YouTube, the entertainment-education approach can help move the needle towards more **ubiquitous and holistic learning opportunities**, **meeting children where they already are**, through entertaining and fun, yet educational content and formats that can target specific skills from foundational literacy and numeracy to digital and life skills.

There are many examples that attest to this approach, utilized both within and outside of classrooms.

- **Sesame Street** is one of the most well-known programmes, with studies and evidence showing its positive impact on test scores and school readiness, especially for disadvantaged children in the US.[87]

- **Minecraft** has become one of the best-selling video games of all time, "with up to 140 million monthly active players across 22 platforms."[88] Additionally, more than 35 million students and teachers in 115 countries[89] are licensed to use **Minecraft Education Edition**, from tackling climate change[90] and building more peaceful worlds[91] to learning about online safety.[92]

- **The Akelius digital language course**, part of the UNICEF-Akelius Foundation partnership, employs a gamified approach to learning foreign languages. As of 2022, the course has been implemented in 10 countries. Findings from the course's implementation and use in **Lebanon**[93] and **Greece**[94] have shown significant improvements in language acquisition among students whose classes utilized it.

- **In Jordan, 1001 Nights Civic and Peace Education Program**[95] targeted children at Syrian refugee camps and learning centres through comic books, an animated TV series and a curriculum that highlighted the value of education, literacy, life skills and civic values, among others, leading to a drop in negative attitudes by 30%, particularly among at-risk children.[96]

- **In Colombia**, the project-based learning model **Evoke: Youth as Agents of Change in the Colombian Peace Process** was implemented by The World Bank over one semester with 297 students at the Soacha campus of Uniminuto University. The programme utilized storytelling, game mechanisms, and global social network methods, with findings indicating that "students who used Evoke demonstrated statistically significant greater learning outcomes in 21st century and socio-emotional skills than did the control groups."[97]

DATA GAPS AND THE POTENTIAL FOR FUTURE RESEARCH:

- More **data, research and evidence** are needed on edutainment approaches and tools, their effectiveness, suitability of formats, impact and use cases for various groups of learners, at scale, in educational settings and for skills development. **Equity, accessibility and inclusion** dimensions could use further investigation to better understand what works, in which formats, and for which users (including children, youth, teachers, caregivers, etc.).

- Exploring **younger children's engagement** with technologies and digital tools, and their impact on their development and learning, requires additional examination, especially after the pandemic period.

WHAT NEEDS TO BE DONE?

- Edutainment programmes, tools and initiatives cannot be truly effective in silo or as a stand-alone approach. Their use and integration should be carefully planned and **complemented with relevant and age-appropriate materials**, resources, content, activities and facilitators.

- While there are well-known global examples of "**edutainment**" initiatives, such as Sesame Street, that specifically target learning outcomes and acquisition of skills, more of such **scalable and culturally relevant initiatives** for various target groups are needed, backed by research and evidence.

- To ensure that technology-enabled learning opportunities within and beyond classrooms are **equitable** and consider no- or low-tech environments, a mix of various technologies and modalities should be employed, from print materials to radio, TV and online videos, to social media and games.

- As children are increasingly online, they are exposed to more risks as well as opportunities. Children and youth require consistent **guidance from teachers, caregivers and communities** on safe, responsible and effective use of technologies and the Internet.[98] Engagement of parents and communities in the education of children has been associated with better performance in school and higher learning outcomes, as well as traditional and digital literacy rates.[99] It is essential to enable adults to be digitally literate and informed so that they can balance the risks and opportunities that come with children's use of technologies and digital spaces.

Just as teachers thrive through communities of practice, children need support in the form of **parental and community guidance**. Parents, families and communities significantly influence children's offline and online behaviors, opportunities and risks. During COVID-19, they had "front-row seats"[100] to children's learning experiences as well as online behaviors. They are allies in the educational and developmental processes of a child, as they engage, support and inform them.

For more information on edutainment and related studies, please refer to the list below (not a comprehensive list):

- UNICEF's blog: The case for edutainment
- UNICEF's reports on the effectiveness of the Akelius digital language course in Lebanon and Greece

Education must be rethought and transformed to **encompass various environments** in which children live and the actors they engage with, and ensure that whatever the activity, online or offline, children can continuously learn, reflect, share and create through any mix of technologies and solutions.

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LOOKING FORWARD

This brief, consisting of the five vitals of digital learning, aims to contribute to the ongoing yet urgent target to transform education, in light of ongoing impacts and consequences of COVID-19 and consistent with the goals of the 2022 Transforming Education Summit held during the UN General Assembly, which was convened in response to the global crisis in education. The conversation will keep evolving and, as such, this brief does not lay out a final or universal list, but rather is **an effort to bring attention to and reflect on the "vitals"**. Just as in health, such signposts uncover the top priority areas and immediate problems, detect underlying issues, and offer a prognosis and a path towards recovery.

Some final reflections:

1 Context matters.

There is no 'one-size-fits-all' approach or solution. No one specific tool or technology can respond to educational needs that are so diverse, complex and context-driven. This is why it is critical to have locally relevant, quality and engaging content and platforms, and a mix of solutions and modalities that understand and are developed according to the needs of end users, including learners, parents and caregivers, and teachers, especially in low resource contexts.

2 Equity and inclusion must be the foundation for digital learning.

One cannot speak of anything digital or tech-related without acknowledging the colossal gaps between the haves and the have-nots. Each vital studied in this brief links back to the question of equity and inclusion. These are the pre-requisite dimensions to transforming education systems and learning environments. Only when we are able to reach and empower the most marginalized children and youth will technology-enabled education reach its true potential.

3 Children require an enabling ecosystem.

It is impossible to pinpoint one factor or vital that can ensure that children have the knowledge and full range of skills to succeed in life. Instead, all the components of learning, home and community environments must develop in unison: electricity, infrastructure, devices and connectivity, national edtech policies, learning and teaching platforms and content, teachers' skills, parents' well-being and education, community involvement, and so much more. This also means that all the actors in children's lives are interconnected, and must therefore be supported, guided, informed and trained to usher children along their learning and developmental journeys. Finally, children themselves must be given the proper tools and opportunities to have a voice; they must be included as key participants in decision-making processes and the creation of solutions related to tech-enabled learning environments.

4 To rethink education we must look beyond schools.

Children do not just learn at school, communicate at home, and play in the playground. Their worlds are intertwined and have evolved with the times. Future learning and edtech strategies should reflect this merging of worlds and realities. Multiple pathways and approaches to learning should be employed to reach as many learners, teachers, caregivers and communities as possible through rich, engaging, fun and educational learning experiences and solutions. Children must be met where they are.

5 We need more data and evidence.

A common finding in myriad other reports, as well as in this brief, is the basic lack of data across almost all the vitals. There is a growing body of evidence in the digital learning space, but it only provides an incomplete and fragmented picture of children's needs, behaviors, risks and opportunities online, as well as of data on other key groups such as teachers, school leaders, caregivers and communities. This report covers global data on national digital learning platforms for the first time, but more timely, quality, comparative, longitudinal, and disaggregated data and studies are sorely needed in order to provide practical and actionable evidence and recommendations that can inform both policymaking and the design of digital learning solutions. In addition, there is a lack of technical capacity and skills to make effective use of such research. An effort must be made to better distil and communicate the evidence, as well as to build the capacity of key decision makers in governments and schools.

6 The future of education is interconnected.

With the acceleration of digital progress and the impact of technologies on every sector, countries are increasingly moving towards digital ecosystems where school, learning and education management systems, platforms, assessment tools and other solutions are progressively complex, interconnected and interdependent. This shift offers myriad prospects and conveniences, but also exposes the shortcomings of current gaps, including in digital skills, and emphasizes the need for inclusive approaches and solutions, clear standards, quality assurance mechanisms, safety and privacy measures to leave no one behind.[101]

The road to **destination "transforming education"** will be long and filled with both numerous challenges and unlimited opportunities. Along this journey, digital learning's enormous potential can only be unlocked with the help of partners and champions leveraging innovative solutions, creating enabling environments, and continuously holding the end users in mind – the world's children and youth.

ANNEX

UNICEF has outlined **five characteristics**[102] **to ensure quality of digital learning solutions**, as follows:

- **Interactive**:[103] unlike broadcast media (e.g. radio, TV), where information flows only in one direction, digital platforms can disseminate information to learners *and* collect it from them, thus potentially closing the feedback loop for learners, and between learners and educators. Interactivity also allows software to assess learners and respond to their progress, providing immediate feedback, and identifying the right set of questions, examples, or problems that best fit the specific progression of a learner—in other words, interactivity enables personalized adaptive learning.
- **Adaptive**:[104] digital platforms can target instruction to meet students' learning levels. By personalizing their instruction these platforms increase the effectiveness and efficiency of learning. Such approaches can be enhanced by the application of artificial intelligence (AI) and machine learning.
- **Playful, and therefore, motivating and engaging**: *gamification* improves students' motivation, engagement, and learning achievement.[105] This is not unique to digital learning, though, because those effects are also expected in other forms of play-based learning.[106]

- **Inclusive**: Universal Design for Learning (UDL) produces hardware and applications to help children with disabilities and all children learn,[107] for example through accessible e-books with sign language, and image description.

- **Safe**: interaction between learners, and between minors and adults, should be regulated, monitored, and moderated to ensure wellbeing of the digital learning environment. The collection and use of data, especially of personally identifiable data, needs to be justified and managed according to best international standard practices. Digital learning solutions should not share data for commercial purposes, or other purposes that have not been explicitly and simply presented or accepted by the learner or caregivers.

In addition to these product design features, there are **characteristics of implementation**, understood as the way in which these tools are used, that either enhance or detract quality. These are:

- **Relevant**: Digital platforms allow learners to practice and refine skills. These skills should match learners' demand because they are seen as relevant in their context, match their personal interest, or life project. This demand needs to be created if the skills are foundational and demand is low—for example, in a hypothetical case in which there is low demand for foundational literacy and numeracy, advocacy with stakeholders and community engagement would be necessary programme components given these skills' essential importance. In the specific case of digital skills, which are both a means and an end of digital learning, initial lack of basic digital skills must be overcome to enable learning.[108]

- **Interoperable**: for certain programmes working at institutional or system level, interoperability enables comprehensive approaches in delivery, as opposed to fragmented digital learning offerings. The ability to contribute to unique personal accounts of learners, where certificates and data for a specific learner or group of learners can be consolidated, and the ability to share data with other education systems is a useful attribute. This can happen through APIs or other forms of integration. While the need for integration and interoperation is contextual, the reality is that few education systems can support and integrate multiple digital learning solutions, all providing standalone and fragmented data with multiple accounts per learner.

- **Pro-equity**: able to work in low or no connectivity environments and run on basic smartphones. Equity is also enhanced by the integration of the solution with a broader blended pedagogical approach that combines in-person instruction with other media more widely available in certain contexts, including printed material, SMS, radio, or tv to increase engagement.[109]

- **Sustainable**: operation of digital learning solutions embedded in a programme requires financial, legal, and operational sustainability. Financial sustainability is more likely if the total cost of ownership of the solution fits within the existing budget envelope. Legal sustainability is more likely if licenses are long-term, or open, allowing for stability in the use of software and content. Operationally, the continued use of a digital learning solution is more likely to last if it is well integrated into existing school routines or if there are incentives to create new routines that integrate them.

- **Pedagogically integrated**: Digital platforms may be combined with in-person instruction and other approaches including paper-based material, mobile phones calls or messages, and to enhance learning, increase engagement, and improve equity.[110]

ENDNOTES

1 UNICEF, 'UNICEF warns of shockingly low levels of learning, with only a third of 10-year-olds globally estimated to be able to read and understand a simple written story,' Press release, UNICEF, New York, 15 September 2022, <www.unicef.org/press-releases/unicef-warns-shockingly-low-levels-learning-only-third-10-year-olds-globally>, accessed 25 October 2022.

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PULSE CHECK

ON DIGITAL LEARNING

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