Background Document 4

Action Memo on Digital Learning for All[1]

The Global Education Forum was established in 2019 to address challenges in the education financing architecture and develop greater collaboration between and coordination of education donors and to advocate for investment and the acceleration of progress towards SDG4.

Based on the outcomes of the Global Education Forum meeting in September 2020 and the priorities identified in the COVID-19 recovery packages of the Global Education Meeting (GEM) and the Save Our Future White Paper, **the April 2021 Forum meeting will focus on a selected number of urgent Action Areas for the coming year as schools reopen and countries turn their attention to building back better in education.** The Action Areas for discussion in the April 2021 meeting include: School Health and Nutrition, Teachers and Vaccination as part of School Reopening, Foundational Learning, and Digital Learning for All.

To facilitate progress on each of these action areas, three Forum working groups have been established, led by Forum members (World Food Programme for School Health and Nutrition, World Bank for Foundational Learning, and UNICEF for Digital Learning) and including Forum members from bilateral and multilateral donors. The special issue on teachers and vaccination was developed by the Technical Advisory Group of Experts on Educational Institutions and COVID-19, which is co-convened by UNESCO, UNICEF, and the World Health Organization (WHO).

The aim of the thematic working groups is to develop concrete proposals for action and build consensus between Forum members on how to move specific themes forward. To support this process, **each working group developed an Action Memo** including a statement of the problem, key priorities to build back better, and concrete proposals for multi-agency action.

In this Action Memo, we consider proposals for donors to support the expansion of digital learning as a key way to accelerate progress toward SDG4. The proposals were developed by a working group, led by UNICEF, and including representatives from Dubai Cares, the Education Commission, EdTech Hub, mEducation Alliance, ITU, UNESCO, and the World Bank.

[1] The drafting of this action memo on Digital Learning Solutions for All was led by Haogen Yao (UNICEF), Rose Sagun (The Education Commission), and Rachel Chuang (EdTech Hub). It reflects the discussion in the working group comprised of representatives from the Alliance for Affordable Internet, Dubai Cares, the Education Commission, EdTech Hub, mEducation Alliance, ITU, UNESCO, UNICEF and the World Bank.

Introduction

The COVID-19 pandemic is threatening to deepen the global learning crisis. As many countries have had to move education online, the pre-existing learning crisis is now being deepened by the pre-existing digital access crisis. 50 percent of children and young people worldwide have no access to the internet anywhere and two thirds do not have access in their homes (ITU and UNICEF, 2020).

Education technology has the potential to either shrink or widen inequalities (David et al., 2020). Digital learning, as referred to in this report, should therefore encompass not just personal learning tools and devices (which often favor students with existing digital access) but also include technology at the teacher, community, and system levels. Education technology not only has to be adapted to the economic and financial constraints of under-resourced contexts, including refugee settings, but also needs be critically examined with accountability and transparency.

When implemented carefully in a way that is tailored to the local context, digital learning solutions can play a key role in not only increasing access to learning, but also improving learning outcomes. Digital learning solutions have been a vehicle for greater equity in education, such as increasing access to learning opportunities for girls and children with disabilities. Solutions designed to enhance teacher instruction and to facilitate self-led learning for students have shown great promise in improving learning outcomes (Rodriguez-Segura, 2020; Kashada, et al., 2017). While cost-effectiveness is a critical issue that poses serious challenges in low-resourced settings, some solutions thoughtfully designed for settings in low-income countries can be scaled-up at cost with minimal compromise to their effectiveness in impacting learning outcomes (Angrist, et al., 2020; Berlinski, et al., 2021; Naik, et al., 2020).

National digitalization agendas are cross-sectoral, but it is important that education is placed at the center of these dialogues when it comes to digital learning. Investments in digital learning ecosystems need to be made now to be able to ensure that those who are already left behind are not further kept away from progress that digitalization brings (EdTech Hub, 2020). The opportunity to harness technology in education and improve learning, expand participation, and increase efficiency has been recognized for a number of years and calls to connect every school to the internet have been made by a number of organizations and Commissions.

The State of Digital Learning in 2020-2021[2]

In this Action Memo, we propose expansion of digital learning as a key way to accelerate progress toward SDG4. While digital learning has lagged behind and needs to be stimulated, we note that effective learning includes multiple components. In particular, digital learning is a complement — not a substitute — to non-digital approaches (Bettinger et al., 2020). We also note that digital learning needs to heed insights about effective pedagogical approaches and how these may differ for different age groups**.**

The digital divide is exacerbating the learning crisis and existing inequities. Digital learning has never been more prominent than in the last year, as billions of children have had their classroom experiences disrupted by COVID-19, and education systems worldwide have turned to digital solutions. Despite this attention, digital solutions remain poorly understood, and evidence for the most effective approaches to technology-enabled learning are ignored. As schools closed due to the pandemic, fewer than 25 percent of low-income countries and 65 percent of lower-middle-income countries were able to immediately set up remote learning platforms due to lack of effective policies, access to devices, or connectivity (WEF, 2020).

Of course, digital learning is not limited to internet-connected approaches, and the quality of education provided to learners worldwide is not directly linked to the provision of devices (Global Education Evidence Advisory Panel, 2020). As an alternative or supplement to online learning platforms, an estimated 68 percent of countries used some combination of high-, low-, and no-tech approaches (e.g., television, radio, paper-based materials) to reach learners during school closures (UNICEF, 2020). Evidence supports the use of broadcast and messaging technologies to improve learning, even though they do not employ the latest digital technologies (Damani & Mitchell, 2020; Watson & McIntyre, 2020; Avitabile & de Hoyos, 2018). That said, the challenge of adapting digital learning to the scale of disruption caused by COVID-19, and the speed with which systems have had to adapt, has meant that most have relied on outdated strategies which are not meeting current needs. It should also be recognized that the role of education actors, parents, and caregivers remains a critical component to learning outcomes - with or without access to devices. A survey of schools in Bangladesh revealed that, even with access to online learning, only 2 percent chose to do so (Biswas et al., 2020), which was partly due to lack of parental support. In cases where there is access to remote learning, such as in learning centers for refugee children in Lebanon, caregivers and education actors are a critical factor to success (Alban et al., 2020).

[2] A few initiatives in this space include: the Broadband Commission Working Group on Digital Learning, the Digital Public Goods Alliance, the E9 Partnership, the EdTech Hub, Giga, mEducation Alliance, and Reimagine Education. Please note this is an incomplete list.

Figure 1. Preliminary estimate of the state of digital learning in 2020-21

- **300 million,** or 1 out of 10 children and young people, are estimated to be accessing "world class" (i.e. quality) digital learning[3] (green)
- **990 million** or 3 out of 10 children and young people are accessing digital learning solutions (DLS) (green + yellow)
- **1.6 billion** or 50 percent of children and young people have access to internet (green + yellow + orange)
- **The remaining 1.6 billion** or 50 percent of children and young people do not have access to internet (red)

Source: UNICEF estimate based on ITU, UIS, UNPD, household surveys, and country office surveys.

The successful adoption of technology in education has also been hampered by countries' inability to concurrently invest in different elements of the broader digital transformation ecosystem. A number of frameworks to describe this "ecosystem" have been developed and generally include the following elements: access to infrastructure and devices; complementary business models and digital learning solutions; supportive education policies and regulatory frameworks as well as public engagement; and human capacity (see Broadband Commission, 2020; Omidyar, 2019; Reimagine Education; Unwin et al. 2020). Some of these elements are under the control of the education sector, while others are under the control of other sectors (e.g., ICT, infrastructure) but with important potential implications for education. For example, national policies and regulation on ICT and digitalization will have an impact on the affordability of access for schools and students.[3]

Developing an effective ecosystem is a coordination challenge because it requires sustained collaboration of various actors over time. Cultivating the broader ecosystem for digital transformation requires a multi-year roadmap with great intentionality on ensuring that the ecosystem is conducive to partnerships (Omidyar, 2019). It also requires a whole-of-government

[3] Under the Reimagine Education framework, "world class" digital learning refers to learning that is interactive, adaptive, playful, inclusive, market-relevant and nimble. As a preliminary estimate and aligned to the context of remote learning during the pandemic, the estimate here is proxied by the rate of students who accessed more than just school platforms (calculated from country surveys) and the household internet access rate (calculated from household surveys).

approach, including collaboration between (at the very least) Ministries of Education, Finance, ICT/Telecommunications, and Infrastructure, among others. An integrated approach is critical for the effective and sustainable development of the digital ecosystem (Unwin et al. 2020).

The development of effective ecosystems and complementary digital learning investments is also challenged by available financial resources. Two-thirds of low- and lower-middle-income countries (where data is available) have cut their public education budgets since the onset of the COVID-19 pandemic (World Bank & UNESCO, 2021). Official Development Assistance (ODA) has also come under pressure from the donor side, especially in light of the economic effects of COVID-19. Just as achieving SDG4 will not be feasible with current education spending, it is key to note that without substantial donor aid or domestic financing, digital learning will prove to be ineffective (Beeharry, 2021).

Building back better: How to harness digital learning in the wake of the COVID-19 pandemic

As school systems reopen and look ahead to restarting education, the global community has an opportunity to revisit its investments in digital learning. In this section we propose five key pieces of guidance that countries and development partners can take into account to enhance the effectiveness of their investments:

- Focus on marginalized learners
- Plan and collaborate across sectors
- Consider connectivity and complementary investments
- Match financing to expansion plans
- Promote Open Educational Resources (OER)

Focus on marginalized learners

Policymakers must consider how they can make long-term investments to improve (digital) learning for all. This means that they must avoid pursuing short-term digital interventions that will only benefit a small minority of children and young people. For example, in response to the pandemic, many governments quickly developed and promoted national online learning platforms to mitigate the impact of school closures; however, these platforms have only reached a few students. Engagement of vulnerable and disadvantaged learners (e.g., children with disabilities, displaced children) must therefore be a top priority to avoid exacerbating existing inequities.[4]

[4] Attention should also be paid to the risks faced by children and teens with the use of digital devices as highlighted in the recommendations of the WHO and American Academy of Pediatrics and the Child Online Safety Declaration (2019).

In the short term, investments in digital learning should be carefully leveraged to ensure that everyone can have access to basic learning opportunities (Unwin et al. 2020). Education decision-makers must assess the availability of devices and internet, as well as other existing digital infrastructure (e.g., radio and television channels, learning management systems) prior to developing a digital learning initiative. In too many cases, hardware or digital investments have been made without tailoring solutions to context and/or without adequate complementary investments and considerations around sustainability of solutions (Beuerman & al., 2015). For many low- and middle-income countries, solutions that combine high-, low-, and no-tech approaches (e.g., radio, television, and SMS messaging) and that are closely contextualized to the needs of learners are often well positioned to reach a higher percentage of learners in the short-term (Tauson & Stannard, 2018).

Infrastructural constraints may bring particular challenges and trade-offs to digital learning for marginalized groups. Careful consideration must be given to prioritization of investments where resources allotted to education are already very limited. The opportunity costs in investing substantially in infrastructure may be very high. Even with widespread presence of connectivity, equitable policies are required to overcome the risk of only providing digital learning to schools with existing infrastructure (DFID, 2018).

Plan and collaborate across sectors

Digital learning expansion plans should be integrated in ICT and education sector planning processes. This is especially critical as costs for infrastructure investments should not be borne by Ministries of Education. Greater coordination at the country level is critical. For example, 174 countries have a broadband plan and several countries are in the process of adopting one. Some are developing broader digital transformation plans. Regional plans also exist, such as the ASEAN ICT Masterplan 2015 or the Africa Digital Transformation Strategy (2020-2030). It is unclear how effectively education objectives have been integrated in ICT strategies vis-a-vis ICT objectives integrated in education sector plans. This led to the Broadband Commission's recent recommendation for planning efforts to escape "silo" thinking and engage cross-sectorally (ITU/UNESCO Broadband Commission, 2020).

Investments in digital transformation ecosystems will need to start with mapping the existing connectivity as well as the status of wider digital learning readiness. Some tools and programs to assist countries in these efforts are already being deployed. For example, as part of the UNICEF and ITU's Giga initiative, Project Connect is supporting countries in mapping their school connectivity and Reimagine Education is supporting countries in assessing their digital learning readiness. Further alignment of existing donor efforts to establish readiness indices is required to jointly facilitate and monitor digital transformation.

Balance investments in connectivity and digital learning

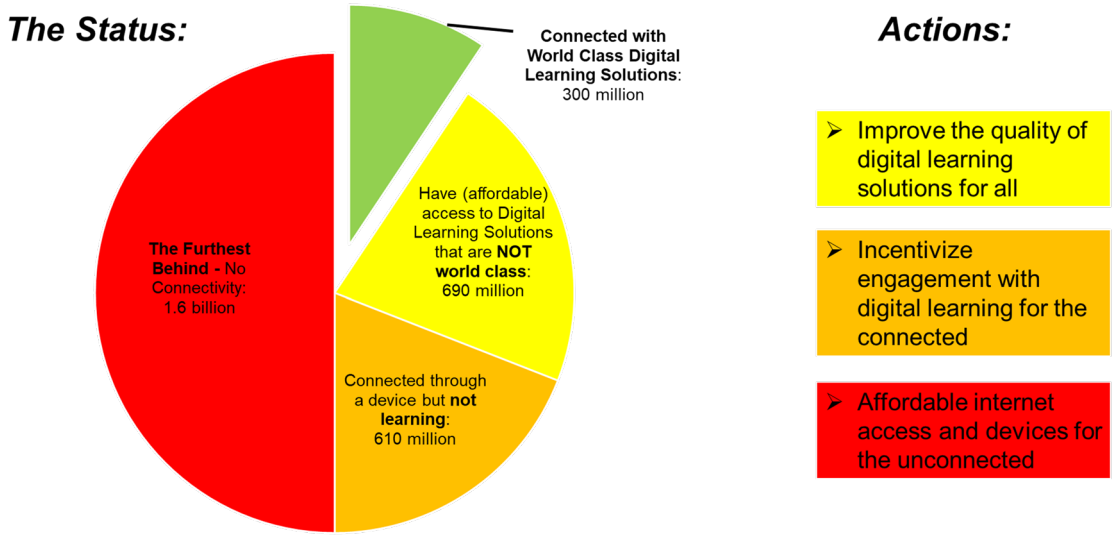
Connectivity will be needed as an enabling factor for widespread and effective digital learning. Where possible, public-private partnerships should be prioritized for low- and lower-middle-income countries to improve affordable connections and transition to digital (online and

offline) learning. For example, the Giga Initiative[5] has mapped over 900,000 schools across 36 in 2020 with details available on the Project Connect platform and developed work plans for 19 countries to connect schools to broadband internet (Giga, 2021). The Giga modality of financing starts with public investment and subsidies and ends with revenue earned by operators once the connectivity starts to generate profits.

Investments in connectivity are essential but all countries should be thinking about three types of investments: (1) improving affordable connectivity; (2) incentivizing engagement with digital learning; and (3) improving the quality of digital learning. These categories should not, however, be thought of as sequential. For example, countries without significant connectivity should not wait to invest in quality digital learning until they have widespread connectivity. The rationale is two-fold. First, there are high-quality digital learning resources that can be effectively used in print or offline, and second, variation in connectivity within the country means that populations within the same country will have different levels of connectivity at different times. For example, a set of curriculum-aligned resources (e.g., "Grade 3 Mathematics") could be available in printed textbook format (with activities on graph paper) while also being available digitally in an LMS (with activities undertaken on GeoGebra); the book might have QR codes linking paper-based activities to digital equivalents. In this way, learners can learn using paper, but depending — on the degree of connectivity and devices available — enrich their learning through "digital".

[5] Giga is an initiative launched by UNICEF and ITU to connect every young person to the internet. The key objective of Giga is to connect 2 million schools and approximately 500 million children and youth by the end of 2025 by: using a strong data infrastructure to identify unmet demand and monitor the quality of connectivity; developing sustainable financing models that will address current market failures in terms of infrastructure and pricing; and, using suitable new technology to extend the reach.

Figure 2. Digital learning actions in response to the state of digital learning in 2020-21



Source: UNICEF Reimagine Education team

Match financing to expansion plans

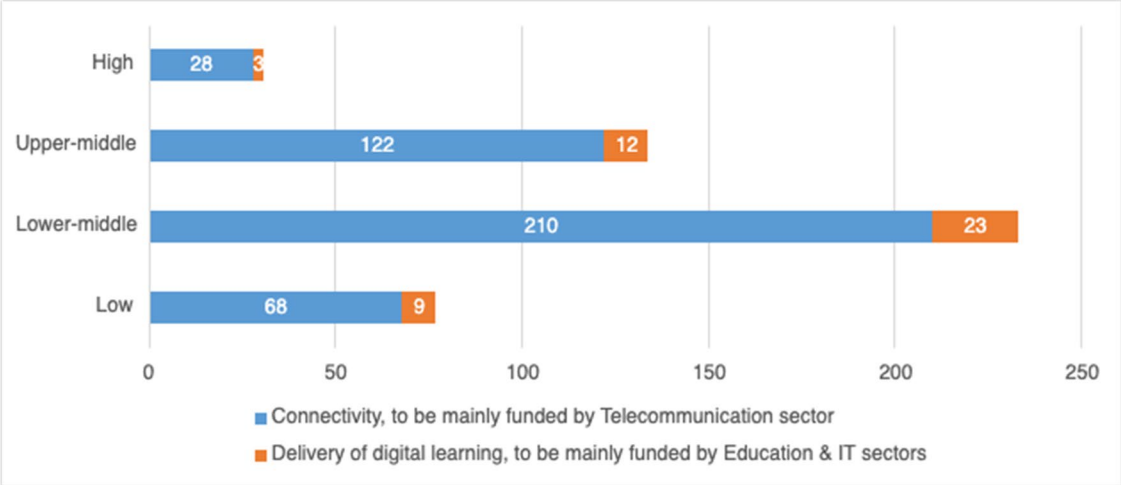
It is critical to consider which parts of government should be investing in these different areas and where private financing can be leveraged. Investments to increase connectivity (and affordable connectivity, in particular) could mainly be led by the telecommunications sector while the education sector focuses its resources on providing a mix of high-, low-, and no-tech remote learning options to meet the needs of all learners now.

Providing broadband connectivity to all will, according to the Alliance for Affordable Internet (A4AI), cost at least $278 billion in low- and lower-middle-income countries (Figure 3, blue bars). These resources will have to come from other parts of the national budget outside of education, supplemented where feasible by external resources. Such investments could be thought of as part of the broader shift of economies towards digitalization. Similarly, even the $3 billion that is needed each year for digital learning in low- and lower-middle-income countries is not likely to be met from national education budgets.

Investments in digital learning (including devices, training, content, mobilization, etc.) could add an additional $3 billion annually to current education financing needs in low- and lower-middle-income countries, a total of $32 billion over the next decade (Figure 3, orange bars). Such an amount, which will not be a one-off investment, but rather will represent a permanent

addition to recurrent education spending, might be feasible from a combination of countries' budgets and external support in normal times. However, it represents a huge challenge in the wake of COVID-19 given already large financing gaps required to address learning losses and enable provision of education services as estimated by UNESCO (GEMR, 2020).

Figure 3. Minimum investment for digital learning by country income level for 2021-30, in $ billion



Source: UNICEF calculation in Annex 1.1, based on data from Alliance for Affordable Internet (A4AI) and estimates from the Reimagine Education costing model, grouped by the World Bank country income group classification for 2021 fiscal year.

At initial stages of development, it will be important to mobilize resources to support country planning efforts as well as testing of new solutions. Under the partnership of Connect Every Child to Learning Everywhere, World Bank and UNICEF estimated that $250 million is needed in the next ten years to support countries to invest in and utilize digital technologies more effectively to address learning poverty and skills development, by developing, deploying, and defusing global public goods and providing technical assistance to targeted countries (see Annex 1.3). Through financial and technical support, UNICEF is supporting countries to implement targeted interventions focused on learning platforms, digital literacy, capacity building, and content development targeting marginalized groups. For example, UNICEF Egypt is working with the Ministry of Education to develop digital accessible learning materials for 15,000 children with print disabilities, which will be uploaded to the Egyptian Knowledge Bank and other government-owned learning platforms.

It is clear that additional resources are going to be needed, including creative innovative financing, such as the Giga bond (on school connectivity) and the International Finance Facility for Education **(IFFEd on education investments)**. Both instruments aim to blend grant and loan finance to provide financing at terms appropriate to different country contexts. Ultimately, more grant aid will be needed for low- and lower-middle-income countries, at a time when aid for education has stopped increasing. Given the tightness of external resources, it will be essential also that the international architecture for education develop a strategy mechanism to avoid any unnecessary duplication of external resources and to ensure that low- and lower-middle-income countries are prioritized; and where possible and appropriate grant resources can be used to leverage other types of financing. Further work is therefore needed at the country and global levels to match financing sources and instruments to expansion plans.

Promote Open Educational Resources (OER)

Recognizing that the production of high-quality curriculum content takes up significant amounts of time and funding and risks duplicated efforts within and across countries, Open Educational Resources (OER) offer an opportunity to save resources by adapting and curating existing materials. OER are teaching and learning materials that are freely available for anyone to access, re-use, and adapt. It often offers alternative or additional subject content but in a number of cases also provides high-quality national curriculum content (Koomar & Jull, 2020; South Africa: Siyavula; USA: OpenUpResources, Illustrative Mathematics). In particular, taking content aligned with national curriculum A and aligning/adapting it for a national curriculum B is far less costly than creating the materials for national curricula A and B separately. For example, in response to school closures, Rising Academies launched Rising on Air, a 20-week program of free and adaptable radio scripts and SMS content. Rising on Air has reached over 10 million children across countries in sub-Saharan Africa and Asia (Rising Academies, n.d.).

In order to deliver the promise of OER, such opportunities for scale and re-use need to be realized. A significant obstacle to this is alignment of resource development and curriculum alignment activities, as well as limited political buy-in for cross-country collaboration. However, such challenges could be addressed through greater structured cooperation, such as a "curriculum alignment hub" that tracks existing alignment efforts by curriculum and sources of content (Chandra, 2020A; Chandra, 2020B). Efforts to increase the availability of OER are already being made by international organizations and could be further strengthened and harmonized**.** For example, UNICEF has been building a global digital learning toolkit through partnerships. It is a package of established digital learning solutions covering literacy and numeracy, STEM, learning management system, and multiple skills areas (see Annex 2).

Proposals for consideration by the Global Education Forum

Building on the principles above, four actions are proposed for consideration. The first is focused on shared commitments and principles. The second then covers how countries must develop cross-sectoral plans to guide their digital learning approaches and identify innovative ways to finance those plans with partners. The third focuses on how the global community could support the first two recommendations by increasing cohesion and coordination across donors in the long-term. The fourth action is an immediate call to action that could help every child get connected to quality learning now.

1. Work towards and advocate for common objectives with a focus on those furthest behind

There is an urgent need to establish common definitions and digital expansion targets that: (1) enable all children to learn right now using no-tech, no-digital (e.g., radio and TV) and digital approaches but (2) offer an evolutionary passage and pathway towards wider use of quality digital learning. Targets could build on the targets set by the UNICEF-World Bank partnership to Connect Every Child To Learning Everywhere (see Annex 1.3).

It is therefore proposed that GEF members work together with each other and countries to help formulate and jointly advocate for digital learning targets for low- and lower-middle-income countries, recognizing the potential of different types of education technology solutions and the gradual introduction of quality digital learning solutions:

- Quality digital learning must be defined by the impact on learning outcomes achieved in remote or classroom contexts, and not simply by the type of technology provided.

- Targets should make specific provisions for equity and reaching those furthest behind, including girls, refugees, minorities, and people with disabilities where education technology and digital approaches could play a particularly important role.

2. Support countries in developing plans for the expansion and financing of digital learning

Digital learning expansion planning must be an inter-sectoral effort. The development and implementation of plans, which should include details on short-term and long-term financing, must be supported by international donors and provide a basis for more effective donor coordination.

It is therefore proposed that:

- **By September 2021, GEF members have identified and started to support 10 countries to develop digital learning expansion plans.** Where relevant, these efforts should be linked to the development of education sector plans for GPE to avoid duplication and inconsistencies. If successful, a target for additional countries could be added every six months with reporting back to the GEF.

- **By December 2021, identify ways to better coordinate and avoid duplication of donor efforts and investments at country and global levels.** Financing sources and instruments should be matched to digital expansion plans at the country and global levels. At the country level, digital expansion plans and education sector plans should clearly lay out needed investments and anticipated financing, and sectoral review missions should monitor plans and their implementation systematically. Common toolkits for digital expansion plans could be developed, along the lines of those developed by IIEP/GPE for education sector plans more broadly. At the global level, it will be essential to identify low- and lower-middle-income digital learning "aid orphan countries" and encourage donors to meet their needs using all available instruments (see point 3 on investment strategies).

- **By April 2022, establish a common set of principles and minimum quality standards to fund digital learning and develop monitoring mechanism to assess coordination and progress**. This would include:

    - **Developing a set of minimum quality standards for funding digital initiatives.** For digital development, it is imperative to have exceptionally good coordination and collaboration among stakeholders. Donors should define a set of minimum standards for funding digital programming, such as adherence to the Principles of Digital Development, producing all outputs as Global Public Goods (open licensing, technological freedom) and transparency in program execution (e.g., by pre-registering outputs/trials, etc.). Similar to transparency initiatives in other areas, such as IATI and All Trials, a way to report on and/or monitor adherence to the minimum quality standards is needed (cf. All Programmes Recorded, All Outputs Reported).

    - **Agreeing to common guidelines to monitor coordination on digital learning across sector planning processes.** Major actors in digital learning (e.g., governments, EdTech and telecom companies, donors, international agencies, and NGOs) are strongly encouraged to coordinate on procedures and indicators on progress reporting. Where relevant, these efforts can be linked to the integration of digital learning into education sector analysis for GPE to avoid duplication and inconsistencies.

    - **Developing "digital transformation" markers for financial tracking** within governments budgets and bilateral/multilateral organizations (e.g., Creditor Reporting System by OECD, Financial Service Tracking by OCHA at the global level; domestic budgets at the country level). It is important to be able to identify what investment are for digital learning before discussing the adequacy, efficiency, and effectiveness of investment.

3. Develop a long-term global investment and support strategy that is adaptive to country needs

Donors should develop a sustainable investment and support strategy that is adaptive and flexible enough to meet the specific needs of countries and the portfolio of instruments available within country contexts. This strategy should have a continued focus on the most marginalized and the poorest countries.

It is therefore proposed that:

- **By September 2021**, **support the Broadband Commission (Digital Learning and 21st Century Financing Models Working Groups) to deliver reports that maps the components of the digital learning ecosystem and potential funding sources and financial instruments for financing in developing countries**. This should also include an assessment of whether costs are one-off or longer term and guidance as to where the funding should be put as a priority to ensure inclusivity and what could be funded by domestic (including potential greater use of Universal Service Funds), private sector, etc. The outcome report will also include a set of recommendations for different stakeholders including private sectors, policy makers and INGOs.

- **Commit to engage with and support the Global Declaration on Connectivity for Education led by UNESCO**. The Global Declaration on Connectivity for Education aims to mobilize commitment among Member States and the private sector to advance connectivity in support of the right to education. The Declaration will be launched at Expo 2020 Dubai. It aligns with the objectives of the United Nations Secretary-General's Roadmap for Digital Cooperation that aims to achieve universal connectivity by 2030, ensuring digital inclusion for all, including the most vulnerable.

- **By December 2021, GEF members could jointly develop a financing strategy and use Expo2020 Dubai as a key moment to mobilize additional resources for digital learning, including from private and public sectors.** At the global level, building on the Broadband Commission report and lessons learned from catalytic fund programs, GEF members could work together to determine what financial support strategy for countries may be feasible. A range of financing instruments may include, but not be limited to, guarantees (e.g., IFFEd) and advanced market commitments (e.g., Giga bond).

4. A special initiative on OER to improve access to "digital learning" tools in short term

To ensure that every child worldwide has the resources they need to learn effectively right now, it is recommended to consider provision of Open Educational Resources (OER) into national systems of education, where appropriate. There are unexplored synergies and economies of scale linked to the development of high-quality curriculum resources that offer

strong value-for-money. Further, OER provide learners and teachers with content in local languages and tailored to the right level, as evidence-based ways to improve learning.

It is therefore proposed that:

- **By December 2021, as part of the global investment strategy, GEF members commit funding for the development of a high-quality set of OER in relevant languages.** These resources need to meet a rigorous set of accessibility standards and cover priority subjects including language, mathematics, global citizenship, and digital skills for higher grades. The resources need to (1) align with and (2) cover national curricula, so that they are viable for national use.

- **By April 2022, support 10 countries to roll-out digital curriculum management practices at the Ministry level and leverage the above set of OER.** The support offered by donors can encourage the integration and uptake of these resources into national curricula. In particular, facilitating resource discovery through appropriate categorization and meta-data tagging can maximize the usability of OER. Further support to ensure that resources are adaptable and can increase their longevity and continued usage. It is estimated that approximately $60 million of initial funding would solve the issue of access to high-quality teaching and learning resources (digitally and in print) for every child worldwide.[6]

[6] This figure of $60 million would cover development of a pool of teaching and learning materials in 1 or 2 languages, as well as using that pool to derive national curriculum-aligned/-covering materials for 5 to 15 countries. Precise figures depending on the degree of curriculum overlap between the participating countries. The recurring cost for print-based materials is expected to be as low as $2–4/child/annum. This figure is affordable even in some of the lowest-income countries. It represents a 5–10-fold reduction in cost compared to business-as-usual, meaning that the break-even could be reached with only around three countries involved. We note that some countries (such as the USA, South Africa and India) have already adopted similar models.

Annex 1
Costing estimates for digital learning

1.1 Cost for reaching all children and young people with quality digital learning

According to estimates by Reimagine Education, realizing quality digital learning for all children and young people will cost $474.5 billion by 2030, but there is tremendous opportunity to lower costs as technology develops and if implementation is at scale. Costs across the five pillars include:

- $7.1 billion for digital solutions - this includes $524 million for immediate catalytic investment at the country level. Investment will be spent on content development and curation, upskilling of teachers and facilitators, communications campaigns, institutional capacity building, and support for data and analytics.

- $428 billion for connecting every school to the internet – this includes $3 billion in initial public financing for the Giga initiative that will catalyze billions in private and institutional finance over the next decade for connectivity.

- $38 billion for devices – this figure is likely to decrease significantly if our focus on market shaping succeeds in radically reducing the costs of devices.

- $1.4 billion for engagement of young people – including costs for mobilizing young people to proactively engage on the Reimagine Education agenda.

- Finally, zero rating digital educational content is one way to decrease barriers of entry to digital learning content and applications. UNICEF is in the process of signing agreements with mobile network operators on zero rating digital educational content that will span 94 countries and 1.8 billion subscribers[7].

Annually, the total cost is equivalent to less-than-1% top-up to the global public education expenditure for digital solutions, devices and engagement combined, plus 3% of the global telecom market revenue for connectivity. This proposed investment is achievable in the presence of a strong shared vision, commitment, and partnership.

The $428 billion for connectivity (A4AI, 2020) is about achieving universal access to broadband connectivity at the global level by 2030, or in other words to roll out and maintain 2.6 million 4G

[7] For example, Airtel Africa-- zero rating 30 learning solutions in 13 countries; Millicom-- zero rating + teacher training in 9 countries in Latin America; Safaricom-- connectivity to 1,000 schools directly impacting 1 million children in Kenya; Vodafone-- zero rating 5 learning solutions in 8 countries plus signed MOU is on data sharing; Zain-- Learning passport in Jordan and support online and blended learning in 8 countries.

base transceiver stations and 700,000 km of backbone fiber transmission infrastructure on top of the existing broadband network capabilities. The total amount includes $288 billion investment by the private sector and $94 billion by the public sector on infrastructure, which covers the capital expenditure on mobile infrastructure, metro and backbone fiber, network operation and maintenance, and remote area coverage. In addition, public spending of $46 billion is demanded for relevant policy and regulation as well as necessary information and communication technology (ICT) skill building and content development.

1.2. Indicative cost for low- and middle-income countries, 2021-30 in $ millions

Low-income countries			
Country	(1) Connect everyone	(2) Digital learning (all children & youth)	Sub-cost (school age)
Afghanistan	4684.5	516.7	275.1
Burkina Faso	2006.0	293.6	161.0
Burundi	1052.8	183.7	101.6
Central African Republic	424.9	101.9	54.8
Chad	1588.1	261.8	144.5
Democratic People's Republic of Korea	2017.8	209.9	109.7
Democratic Republic of the Congo	8559.5	1149.1	636.4
Eritrea	431.5	72.6	38.3
Ethiopia	12372.1	1249.6	676.0
Gambia	130.2	47.0	25.8
Guinea	1221.9	184.9	100.9
Guinea-Bissau	151.3	47.1	25.7
Haiti	1131.0	130.9	68.9
Liberia	401.4	95.7	51.8
Madagascar	2073.7	361.1	196.7
Malawi	1754.4	270.0	145.6
Mali	2073.2	280.8	155.0
Mozambique	4401.5	423.2	232.1

Niger	2798.2	354.9	199.4
Rwanda	941.4	157.8	85.3
Sierra Leone	625.6	136.6	73.5
Somalia	2223.4	245.6	136.2
South Sudan	1318.0	168.2	91.4
Sudan	4425.7	412.7	223.4
Syrian Arab Republic	1745.8	155.5	84.9
Tajikistan	869.2	104.2	57.3
Togo	661.1	132.4	71.6
Uganda	3448.3	584.8	318.4
Yemen	2411.8	326.2	175.0
Lower-middle-income countries			
Country	**(1) Connect everyone**	**(2) Digital learning (all children & youth)**	**Sub-cost (school age)**
Algeria	2069.3	254.7	137.1
Angola	2837.1	426.8	236.2
Bangladesh	16275.3	1517.7	781.4
Benin	922.1	169.1	92.7
Bhutan	38.8	18.4	9.4
Bolivia (Plurinational State of)	1550.1	109.7	57.6
Cabo Verde	44.0	92.6	49.0
Cambodia	1029.6	266.6	140.8
Cameroon	1615.8	207.1	112.7
Comoros	58.3	25.0	13.6
Congo	390.8	101.9	55.3
Côte d'Ivoire	1846.6	238.5	130.8
Djibouti	48.4	18.1	9.5
Egypt	7165.1	646.6	352.3
El Salvador	628.5	67.1	35.1

Eswatini	93.3	22.5	11.8
Ghana	2145.8	297.3	160.6
Honduras	1011.6	108.6	56.4
India	95092.6	9672.9	4953.2
Kenya	3509.0	657.6	348.3
Kiribati	6.5	14.5	7.7
Kyrgyzstan	339.2	70.3	38.0
Lao People's Democratic Republic	632.4	96.2	50.5
Lesotho	110.8	39.1	21.0
Mauritania	618.7	80.0	43.8
Micronesia (Federated States of)	7.0	14.2	7.5
Mongolia	181.0	37.4	20.2
Morocco	1448.9	176.6	92.9
Myanmar	4226.5	406.1	208.5
Nepal	1851.5	265.1	136.0
Nicaragua	911.6	72.2	37.8
Nigeria	14160.0	1678.7	924.1
Pakistan	15802.7	2250.2	1207.6
Palestine	350.4	54.9	29.6
Papua New Guinea	997.1	133.5	71.3
Philippines	3284.9	561.8	293.1
Republic of Moldova	260.8	27.1	13.8
Sao Tome and Principe	16.3	15.3	8.3
Senegal	1269.4	162.2	88.5
Solomon Islands	47.1	21.4	11.9
Sri Lanka	1285.0	176.1	90.9
Timor-Leste	120.8	34.2	18.4
Tunisia	606.9	73.4	39.0
Ukraine	2012.4	136.0	68.3
United Republic of Tanzania	7854.6	664.7	364.8

Uzbekistan	3378.8	199.7	105.8
Vanuatu	17.5	16.4	8.7
Viet Nam	6438.6	300.4	158.2
Zambia	1512.4	254.1	138.7
Zimbabwe	1471.6	197.7	105.5
Upper-middle-income countries			
Country	**(1) Connect everyone**	**(2) Digital learning (all children & youth)**	**Sub-cost (school age)**
Albania	157.0	28.1	14.7
American Samoa	0.0	10.4	6.8
Argentina	1958.2	167.2	87.5
Armenia	182.8	31.1	16.1
Azerbaijan	1168.5	49.6	26.2
Belarus	321.0	35.0	18.5
Belize	37.0	16.4	8.6
Bosnia and Herzegovina	414.7	21.2	10.2
Botswana	199.3	37.2	19.7
Brazil	11116.1	636.7	326.6
Bulgaria	306.1	38.1	19.0
China	40453.7	5006.4	2576.1
Colombia	3376.4	202.5	103.8
Costa Rica	436.8	33.8	17.4
Cuba	626.2	59.2	30.3
Dominica	8.5	13.2	6.8
Dominican Republic	1146.1	64.4	33.8
Ecuador	1088.9	112.4	59.1
Equatorial Guinea	113.5	32.3	17.2
Fiji	15.4	18.4	9.8
Gabon	107.7	30.9	17.0

Georgia	210.0	33.8	17.6
Grenada	12.0	13.4	7.0
Guatemala	1777.5	112.0	59.2
Guyana	122.8	17.9	9.6
Indonesia	17901.0	1760.5	920.9
Iran (Islamic Republic of)	2742.2	264.7	141.0
Iraq	3385.8	184.4	99.7
Jamaica	229.2	32.9	17.2
Jordan	270.8	80.4	41.6
Kazakhstan	928.7	68.5	36.5
Lebanon	165.1	39.4	20.6
Libya	1037.4	79.6	41.3
Malaysia	886.2	98.0	51.3
Maldives	19.5	14.9	7.7
Marshall Islands	0.0	13.6	7.0
Mexico	13870.8	526.7	272.5
Montenegro	26.7	14.9	7.7
Namibia	99.3	36.9	20.0
North Macedonia	123.8	17.3	8.8
Paraguay	758.3	53.3	27.9
Peru	1412.9	177.7	93.0
Russian Federation	2392.4	230.5	120.7
Saint Lucia	28.3	14.0	7.2
Saint Vincent and the Grenadines	26.3	14.0	7.2
Samoa	8.1	14.6	7.9
Serbia	655.9	35.1	17.6
South Africa	1318.5	320.8	167.8
Suriname	52.3	16.6	8.7
Thailand	1748.6	269.7	135.3
Tonga	5.3	13.7	7.2

Turkey	3816.3	297.1	154.0
Turkmenistan	563.0	70.1	37.9
Tuvalu	0.0	13.1	6.8
Venezuela (Bolivarian Republic of)	2312.5	124.3	63.9

Source and note: UNICEF calculation based on data from Alliance for Affordable Internet (A4AI) and estimates from the Reimagine Education costing model. The countries are UIS countries grouped by the World Bank income group classification for 2021 fiscal year. The connectivity cost estimates were calculated as part of a global investment model prepared for ITU-A4AI Connecting Humanity Report, and not for country specific models. For more details and further country specific analysis and estimates, please contact the A4AI team at a4ai@webfounddation.org. The costs for delivery of digital learning were calculated for the frugal scenario and with a disaggregation for school-age children (1-year preprimary + primary + secondary age). For further information about the modeling and for more customized estimate at country level, please contact hayao@unicef.org.

1.3 Cost estimates for low-and lower-middle-income countries under Connect Every Child to Learning Everywhere

The World Bank-UNICEF partnership to Connect Every Child to Learning Everywhere focuses on LICs and LMICs and estimates costs at $32 billion.

Targets & costs	***2022***	***2025***	***2030***	***Funding source***
Number of children reached	***100 million*** *additional children and young people*	***+440 million*** *additional children and young people*	***+404 million*** *additional children and young people*	
Ensuring that all children and youth have access to quality digital resources for their learning	*2.8B*	*10.3B*	*13B*	▪ Domestic budgets ▪ Loans (IFIs) ▪ Public-private partnerships ▪ Tradeable securities ▪ Targeted equity investments, with standard returns and exit options ▪ ODA
Personalized and Adaptive Learning Solutions at scale	*440M*	*890M*	*890M*	▪ Domestic budgets ▪ ODA ▪ Private sector
Regular formative Learning Assessments and increased use of data for evidence-based decision making	*160M*	*330M*	*330M*	▪ Domestic budgets ▪ ODA

Technology to empower teachers with the skills to deliver learning anytime, anywhere	*570M*	*1.1B*	*1.1B*	▪ Domestic budgets ▪ Public-private partnerships ▪ Innovative financing and procurement models: demand aggregation to increase bargaining power ▪ ODA
Capacity building of Ministries of Education and engagement of the eco-system	*30M*	*50M*	*50M*	▪ Domestic budgets ODA
Total about 32B	***4B***	***12.7B***	***15.4B***	

Note: the estimates are provided by Giga and UNICEF education team utilizing a number of existing indicators for calculation, including the learning poverty rate, internet access rate, demographic projection or 0-19 year olds, etc. Certain assumptions were applied to the calculation, including 30% of curriculum to be digitized, $20 per student and $50 per teacher/facilitator on device, $20 per teacher or facilitator upskilled, etc. Detailed calculation and further customization are available upon request. To Learn more about the World Bank-UNICEF partnership, please contact rcooper@unicef.org.

Annex 2

Snapshot of the Global Digital Learning Toolkit

The Global Digital Learning Toolkit (as of March 2021)

LITERACY AND NUMERACY Khan Academy Worldreader Akelius Language Learning App + Platform Age of Learning Foundation products: ABC Mouse + Mastering Math + ReadingIQ Google Read Along	**LMS and Communication** Learning Passport Google Classroom Microsoft Teams
STEM (including Digital Skills) Scratch – Content and Software for Coding Twig – Content via Learning Passport PhET – Content via Learning Passport Code Academy	**Multiple Skill Areas** Pearson IYF—Passport to Success edX Udacity Coursera Rumie Y—StartUp School Aprende

Types of implementation, scale, and equity

Mode	Scale (# of learners)	Focus on marginalized
Ministry of Education/schools	High	Medium (only reaches children in school)
Implementing Partners (with learning centers)	Low (in most contexts, but potentially medium if large informal sector)	High (particularly if implementing partner works with marginalized groups such as refugees)
Direct to caregivers/students through communication campaign/social mobilization	High	Low (as communication campaigns likely reach more advantaged children)

For further information more about the global digital learning toolkit, please contact jgiraldo@unicef.org.