SAVE OUR FUTURE

Background Paper 3:

EdTech and COVID-19 Response

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About the campaign

Save Our Future is a global coalition of diverse voices - from CSOs to the private sector, youth to researchers, media to multilaterals, foundations to influences and more - all uniting to deliver a simple, yet powerful message amidst the COVID-19 crisis: **Save Our Future.**

This campaign, supported by hundreds of organizations worldwide, is driving awareness and emphasizing the connection between education and advancing the other UN Sustainable Development goals; showcasing education solutions and innovations backed by evidence-based research; bringing together communities and diverse stakeholders to promote collaboration; and engaging people around the world in a dialogue around education to ensure all children can learn.

As part of the Save Our Future campaign, the Save Our Future white paper *Averting an Education Catastrophe for the World's Children* was developed and launched on October 22, with key actions and recommendations for global decisionmakers on protecting and prioritizing education amidst COVID-19.

For further information, please contact campaign@saveourfuture.world. To learn more about the Save Our Future campaign, please visit www.saveourfuture.world.

Background paper prepared for the Save Our Future white paper *Averting an Education Catastrophe for the World's Children*

EdTech and COVID-19 Response

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List of abbreviations and acronyms

COVID-19	Coronavirus disease
CSO	Civil society organization
EdTech	Educational technology
FCDO	Foreign, Commonwealth & Development Office (United Kingdom), formerly the Department for International Development (DFID)
INEE	Inter-agency Network for Education in Emergencies
INGO	International Non-Governmental Organization
NGO	Non-Governmental Organization
OER	Open Educational Resources
RACE II	Reaching All Children with Education II (Lebanon)
SDG 4	Sustainable Development Goal 4
TPD	Teacher Professional Development
T-TEL	Transforming Teacher Education and Learning (Ghana)
UN	United Nations
UNESCO	United Nations Educational, Scientific and Cultural Organization
USAID	United States Agency for International Development

Current situation

The COVID-19 pandemic has exacerbated the global learning crisis, with 1.6 billion learners losing access to their classrooms (UNESCO, 2020). In low- and middle-income countries, many learners do not acquire foundational skills in literacy, numeracy, and socio-emotional learning despite regularly attending school. In sub-Saharan Africa, 88 percent of the school-age population is not proficient in literacy (UNESCO Institute for Statistics, 2017). Systemic challenges such as poor school management, underqualified teachers, and limited resources are some of the factors underpinning this learning crisis (World Bank, 2018).

Recovery from the pandemic and transition back to regular schooling will likely be slow, with the potential for fundamental changes to schooling patterns. Save the Children estimates that as many as 9.7 million children will never return to school (Wagner & Warren, 2020). In the year after the Ebola crisis, 27 percent of Liberian secondary school students did not return to formal education (Kastelic & Kastelic, 2015). Given the scale of impact, this paper focuses on school-age learners while recognizing that learning is lifelong.

National governments have turned to educational technology to support the immediate education response to COVID-19 as well as long-term system recovery. Since the onset of the pandemic, 186 countries and territories have used radio, television, or online platforms to provide children with learning continuity (Hares & Crawfurd, 2020). Policymakers are currently exploring the option of using technology as part of a mixed or blended education model to support remedial learning and build resilience to future crises as schools reopen (Rogers, et al., 2020).

Despite some initial optimism, emerging evidence from low-income countries indicates that few children are using EdTech to learn during the current pandemic. In Senegal, less than 11 percent of students have used radio, television, or web-based courses to study while out of school (Le Nestour et al., 2020). Only 22 percent of children in Kenya currently have access to digital learning materials even though the government has established an ostensibly supportive policy environment (Uwezo Kenya, 2020).

The situation is worse for students from remote areas and less affluent households. Global estimates suggest that a minimum of 580 million students — or around 40 percent of students from pre-primary to upper secondary — are not reached by remote learning interventions (digital or broadcast). An average of 3 out of 4 of these unreached students live in rural areas; lower-income countries are affected disproportionately (UNICEF, 2020). For example, only 2.6 percent of learners from rural villages in Senegal have pursued technology-based learning activities since schools closed (Le Nestour et al., 2020). In Kenya, children enrolled at private primary schools are three times more likely to have access to digital resources than children in government schools (Uwezo Kenya, 2020).

The most promising use of EdTech as part of the COVID-19 response is to focus on addressing the root causes of the learning crisis to create a more resilient and equitable system. A holistic approach to EdTech at several levels — education systems, teachers, and learners — is here explored in terms of both evidence and opportunities. The considered scope of EdTech is broad, including hardware (feature

phones, smartphones, radios, televisions, tablets, and laptops), software (for student/teacher use, as well as for management, monitoring and evaluation), infrastructure (electricity, local connectivity, internet), and other digital approaches (open licensing, open innovation, crowdsourcing). The appropriate use of any such technology in education is necessary — but far from sufficient — for making a lasting post-pandemic impact.

Summary of evidence: System, teachers, learners

The use of EdTech is relatively new and rapidly changing, resulting in broad gaps in evidence on the efficacy and cost-effectiveness of EdTech interventions. Nevertheless, a holistic approach to the use of EdTech points to three critical areas to consider in the COVID-19 response: the education system, teachers, and learners. These areas are discussed below, setting the stage for a set of recommendations aimed at education decision-makers.

Some challenges in knowing what works in EdTech

Rigorous evidence on what is most effective in using EdTech is limited. EdTech is relatively new in most education systems, rarely implemented at scale, and continuously evolving. Much more needs to be done in the medium and long term to enhance this evidence base (EdTech Hub: Hennessy, et al., 2020). That said, there are promising uses of educational technology that are important to build on, particularly at a time when the face of education may be changing, and decision-makers are calling for increased use of technology in education.

The field is often driven by the 'hype' of new technology, and the political and financial interests that accompany it (Selwyn, 2016). The competing interests of humanitarian and for-profit organizations can be a challenge in terms of developing interventions that are sustainable in the longer term (Menashy, & Zakharia, 2017). Interventions can be abandoned if there is not an immediate reward, which inhibits further refinement and development.

The rate of technological development — led by innovations in consumer products — outpaces the rate of rigorous research to evaluate the efficacy and cost-effectiveness of EdTech interventions. The rush to implement in times of crises may mask inequities in practice unless an attempt is made to support marginalized populations (Wagner, 2001; Wagner, 2018a; Rubagiza, et al., 2011). Systematic monitoring and evaluation need to become standard practice in EdTech interventions (Wagner, et al., 2005).

Research reveals a mixed picture in terms of the effectiveness of EdTech interventions. Much research takes place in controlled experimental conditions, and results do not translate into practice (Lai, & Bower, 2020). In particular, variations in implementation can lead to significantly impact the efficacy of EdTech interventions (Kerwin & Thornton, 2020; Outhwaite, et al., 2019). Moreover, interventions may require unrealistic conditions for success. Effective underpinning design principles that allow for flexibility in deployment can promote local adaptation across various contexts (Haßler, et al., 2018; Joyce, & Cartwright, 2019).

Rigorous research designs will build a stronger evidence base, yet dialog with implementers and policymakers is required to translate insights into lasting change (Outhred & Lipcan, 2020). An ecological framework — taking diverse stakeholders and perspectives into account — is needed to understand technology within education systems (Hammond, 2020).

How does EdTech interact with education systems?

EdTech is tainted by a history of failed 'silver bullet' interventions (Helwig et al., 1999; Krätli & Dyer, 2009). Instead of rushing to 'quick fixes', the challenge of COVID-19 can only be met through longer-term systems thinking (Haßler, 2020).

A systems approach to the use of EdTech can help improve learning outcomes (Gupta & Gupta, 2013; Trucano, 2016; World Bank, 2018). A systems approach can inform why 'common sense' interventions to improve education may not work (Steiner-Khamsi et al., 2015; Pritchett, 2015). The success or failure of education interventions partly depends on the wider political and socio-economic context (Kingdon et al., 2014). Evidence suggests that EdTech can complement other interventions across the education system. In Kenya, the Tusome program combined student textbooks, teaching guides, and technology-supported teacher education to generate significant improvements in early-grade literacy (Bruns, 2018; Piper, et al., 2018). Under this program, curriculum support officers used tablets with an observation toolkit to collect data and deliver feedback to teachers during school visits (Piper, et al., 2018).

Potential for using EdTech to strengthen education systems

EdTech does not improve learning outcomes in isolation and needs to be embedded within the broader education system (OECD, 2015; DFID, 2018). Evidence suggests that simple, affordable, and scalable EdTech is more likely to be educationally effective and economically sustainable (Krätli & Dyer, 2009). Notably, there is a balance to be struck between centralized and locally adaptive approaches. For example, education decision-makers should consider the ideas and inputs of local teachers when designing technology-supported professional development programs (Crouch, 2020). It does not only stand to reason, but there is also growing evidence, that EdTech has the biggest impact on student outcomes when it is combined with effective teaching practices (such as feedback, self-regulation, collaborative learning; Education Endowment Foundation, 2020; see below).

EdTech can make an education system more resilient to immediate challenges and future crises. For children in privileged circumstances, carefully planned EdTech interventions can contribute to learning (Education Endowment Foundation, 2020). Where available, teachers can reasonably draw on EdTech to mitigate learning loss during periods of school closure (David et al., 2020). However, EdTech is only one approach among many, and the high expectations of EdTech as a panacea for the learning crisis have not yet materialized (Selwyn, 2016; Haßler et al., 2016; McBurnie & Haßler, 2020). Moreover, important questions about equity prevail. In both low- and high-income countries, the distribution of EdTech — and the possibility to use EdTech — remains deeply unequal. For example, in England, 60 percent of private schools had online learning systems in place at the beginning of the current pandemic compared to 23

percent of schools in the poorest areas (Cullinane & Montacute, 2020). One of the most important uses of EdTech may be at the management level where the use of technology and connectivity can enhance system resilience as well as national and international cooperation (Trucano, 2014).

EdTech must be considered within wider designs for equitable system recovery. The INEE Minimum Standards Handbook illustrates the importance of incorporating equity into each level of the education system following crises (INEE, 2012). COVID-19 is widening the digital divide, and EdTech can shrink or widen such inequalities (David et al., 2020). For example, refugee children may not have access to high-tech products and may, therefore, not benefit from national distance learning efforts. Interventions that respond to systemic constraints — by carefully selecting and combining appropriate high-, low-, and no-tech approaches — are essential in reaching marginalized children (INEE, 2012).

A systems approach can inform decisions about where to deploy EdTech to best address the needs of the whole education system. While there are several areas where technology could contribute to education systems, one of the most promising is supporting the collection — and use of — educational data across multiple areas of an education system. This approach can provide critical information on where the most urgent improvements are needed.

Evidence suggests that both the lack of available data and the poor use of existing data preclude educational improvements (Crouch, 2019). Only 23 percent of countries report on the full range of SDG4 indicators to UNESCO's Institute for Statistics (Lynch, 2019). Available data tends to focus on access to learning rather than learning quality (Crouch, 2019). The use of existing data is a significant challenge as low-income countries often lack the capacity to interpret and exploit data to meet the needs of schools and to improve education planning (Piper et al., 2018).

The use of data can act as a 'lever of change', providing greater accountability for progress and monitoring improvements for marginalized learners. In Pakistan, for example, real-time school monitoring systems feed governance data back to policymakers who can direct funds to struggling schools (Global Partnership for Education, 2019). Without robust data on workforce management, it is difficult to direct resources to address the needs of rural children (Naylor et al., 2019). Studies on the Tusome program in Kenya suggest that high quality data enabled teachers to quickly adapt and improve their teaching model by providing rapid feedback (Piper et al., 2018).

EdTech interventions must conform to high standards of privacy and data protection, particularly in countries with little or no data protection laws. The UN Conference on Trade and Development reports that only 43 percent of the world's 'least developed countries have privacy and data protection legislation (UNCTAD, 2020). Similarly, there is a concern that EdTech interventions continue to exhibit inconsistent privacy and security practices despite improvements (Kelly et al., 2019). The use of EdTech and data in a weak regulatory environment makes it vital that EdTech interventions subscribe to the highest standards of transparency, security, and privacy (EdTech Hub: Haßler, 2020). In 2016, the Tanzanian government cited the lack of privacy laws as one of several barriers to technological development (EdTech Hub: Groeneveld & Taddese, 2020). Standards for EdTech — such as the UK's 2020 'Age Appropriate Design Code' — are urgently needed to ensure privacy and security, including child protection (ICO, 2020).

Need for an enabling environment for the use of EdTech

EdTech interventions are impacted by the political context in which the education system operates (DFID, 2018). For example, strong Lebanese political support and a clear policy (RACE II) were instrumental in the multilateral effort to support the education of refugee children in Lebanon from 2016 (DFID, 2016). Notably, 'political will' is also important at a local level. The impact of education reform in Sri Lanka, for instance, was fundamentally affected by the influence of 'local-level' leaders and stakeholders (Little, 2011). Political leadership must enable and encourage contributions from the private sector in areas such as technology production and infrastructure provision. However, decision-makers need to ensure that equity is maintained. Education for all is a global good and must not depend on proprietary approaches (United Nations, 2020). Cooperation among stakeholders and a dedicated EdTech policy that sits within a wider education plan are essential features of an 'enabling' environment for EdTech (EdTech Hub: Groeneveld & Taddese, 2020).

Long-term improvements in child learning outcomes and holistic skills development depend on the sustained commitment of all components of education systems, including finance (Levin & Fullan, 2008). Over time, EdTech interventions will likely incur two main categories of costs:

- Products: providing and maintaining equipment, teaching and learning materials, data systems and infrastructure (DFID, 2018)
- People: capacity building of teachers and other stakeholders (DFID, 2018)

EdTech does not only have to be adapted to the economic and financial constraints of different contexts, but it also needs to offer value for money in relation to learning gains. While EdTech use can make some contribution to learning, it does not necessarily constitute the most effective or cost-effective approach (Tauson & Stannard, 2018; Education Endowment Foundation, 2020).

The limits of infrastructure need to be taken into account when considering opportunities to use EdTech (Tauson & Stannard, 2018). EdTech policy in Sierra Leone, for instance, is 'mobile-first' and recognizes the high level of mobile phone use across the country (EdTech Hub: Upadhyay & Taddese, 2020). Infrastructural constraints may bring challenges to providing EdTech to marginalized groups. Equitable policies are required to overcome the risk of only providing EdTech to schools with existing infrastructure (DFID, 2018).

How can EdTech strengthen the effectiveness of teachers and the education workforce?

The education workforce and learning teams — consisting of school leaders, teachers, trainees, support staff, and community members — play a central role in addressing the learning crisis. However, many teachers in low- and middle-income countries are underqualified and unsupported (World Bank, 2018; Education Commission, 2019). Teacher education programs — and improvements in teaching quality — offer a pathway toward improving student learning outcomes and holistic skills development (Hattie,

2008; Evans & Popova, 2016; Popova et al., 2018). Importantly, the impact of other interventions in the education system often depends on concurrent improvements in teaching practice and vice versa (Buhl-Wiggers et al., 2017; Piper et al., 2018).

Education decision-makers should use technology to support — and not replace — school-centered approaches to teacher education (McAleavy et al., 2018; Oakley et al., 2018; Education Commission, 2019). In Indonesia, Burns (2013) compared a wholly online approach to teacher professional development (TPD) with models that used online learning to supplement school-based coaching. While less than a third of participants completed the online course, no teachers dropped out of the hybrid school-based programs. These findings align with studies that identify high attrition rates as a limitation of massive open online courses (Lim et al., 2018).

Similarly, the use of technology to deliver virtual coaching to individual teachers appears to have a limited impact over time in low- and middle-income countries. In South Africa, the Early Grade Reading Study program piloted a virtual coaching model in which teachers received tablets with preloaded lesson plans and phone-based support from an external coach. After three years, virtual coaching proved far less effective at improving foundational learning than on-site coaching; virtual coaching had no impact on English literacy kills and a negative effect on home language literacy (Kotze et al., 2019; Cilliers et al., 2020). For virtual coaching, the absence of in-person classroom visits constrains opportunities for giving observation-based feedback, monitor the application of new techniques, and build trusting long-term relationships with teachers (Cilliers et al., 2020). It is undoubtedly the case that any coaching requires strong pedagogical and content knowledge. In low- and middle-income countries, there is often a lack of relevant expertise. In this context, semi-structured session plans requiring basic facilitation skills can support school-based, peer-led teacher professional development programs (Haßler et al., 2018).

With or without the support of technology, teacher education programs need to deliver and structure content to develop reflective professionals with relevant pedagogical expertise. To achieve this goal, teacher education programs should adhere to the following design principles (Haßler et al., 2019):

1. **Focus on – and explicitly promote – student learning outcomes** (Cordingley et al., 2015; Haßler et al., 2018). In doing so, teacher education programs should focus on effective teaching practices such as feedback, collaborative learning, questioning, socio-emotional learning, and learning through play (Education Endowment Foundation, 2020; Parker & Thomsen, 2019; Westbrook et al., 2013).
2. **Schedule regular ongoing teacher professional development sessions as part of the school timetable.** One-off interventions in external venues have proven more expensive and less effective than sustained school-based initiatives (Cordingley et al., 2015; Education Commission, 2019; Power et al., 2019).
3. **Offer frequent opportunities to apply new methods and to critically reflect on teaching practices** (Walter & Briggs, 2012; Westbrook et al., 2013; Education Commission, 2019). Teacher education programs should follow a practice-based cycle in which teachers learn about new

approaches, trial these approaches in the classroom, and reflect on their instructional practice (Haßler et al., 2018; Education Commission, 2019).

4. **Support school-based, peer-facilitated teacher professional development models directly relevant to the context in which teachers work** (McAleavy et al., 2018; Power et al., 2019). External support including (remote) coaching for peer facilitators and school leaders is essential (Haßler et al., 2018) and may be more feasible than directly coaching individual teachers (Haßler et al., 2019).
5. **Focus on developing practical subject pedagogy rather than theoretical general pedagogy** (Popova et al., 2016; Darling-Hammond et al., 2016; McAleavy et al., 2018). Notably, teachers across different subjects benefit from comparing and reflecting on their subject pedagogies.

Technology can be used to enhance these characteristics of teacher education programs. The choice of technology should reflect what teachers from the most marginalized communities can afford, access, and operate (McAleavy et al., 2018).

Open Educational Resources (OER) can provide logically structured content for regularly scheduled school-based teacher and workforce education programs. In Zambia, the OER4Schools program developed openly licensed teacher professional development materials with session plans and exercises for 28 peer-led workshops on interactive subject pedagogy, questioning, group work, and Assessment for Learning (Hennessy et al., 2014). After completing the program, participants increasingly adapted their teaching to students' learning levels (Hennessy et al., 2016). In Ghana, the government's Transforming Teacher Education and Learning (T-TEL) initiative developed a set of Open Educational Resources to support teacher education in the country's 46 Public Colleges of Education. Like OER4Schools, the T-TEL program structured teacher professional development content into different thematic areas such as questioning and group work. During the first two years of program implementation, the percentage of teachers using student-focused techniques rose from 26.1 to 65.9 percent (T-TEL, 2017).

Mobile technologies can support teachers to facilitate school-based teacher group meetings. In Zambia, the Roger Federer Foundation developed the iAct Android app to offer ongoing support to school-based communities of practice (Roger Federer Foundation, 2016). The app provides scaffolding for teacher-facilitators to organize and administer workshops on learner-centered teaching. Like OER4Schools, the app contains videos of interactive teaching — in Zambian schools — for professional development groups to watch and discuss. In teacher professional development sessions, videos can provide a tangible stimulus for critical reflection on instructional practice and negotiating complex classroom situations (Marsh & Mitchell, 2014). Teachers can also record and share videos of each other's lessons to identify meaningful steps to improve their practice (Borko et al., 2008).

Mobile technologies can be used to strengthen peer communication and collaborative learning. In Kenya, the Teachers for Teachers program set up a WhatsApp group for teachers in the Kakuma refugee camp to identify resources and strategies to improve their instructional practice (Mendenhall, 2017). On WhatsApp, teachers shared ideas on classroom management, lesson planning, and student assessment (Mendenhall, 2017). After the first year of the program, nearly 50 percent of participating teachers

reported that they had trialed and effectively adapted suggested pedagogical approaches in their classrooms (Mendenhall, 2017).

How can EdTech improve student learning and reduce inequities?

While the COVID-19 pandemic has disrupted the education of most learners worldwide, those who are already disadvantaged are worst affected. School closures have amplified the existing learning crisis, which disproportionately affects marginalized children. During the Ebola epidemic in West Africa, girls were less likely than boys to continue their studies at home or to return to school (Plan International, 2015). Country responses to COVID-19 need to address socio-economic inequality, gaps in technology, and gaps in learning (United Nations, 2020; McAleavy et al., 2020).

Immediate responses to the COVID-19 pandemic have involved a range of technologies, including radio, television, and mobile phones (Vegas, 2020). Education providers have adopted multiple modalities intending to reach a higher proportion of learners (Dreesen et al., 2020). However, significant gaps remain due to the limitations of different technologies and the challenges that different groups of learners face (McBurnie & Haßler, 2020). For example, rates of radio and television ownership vary dramatically across countries, regions, and income levels (Dreesen et al., 2020). Education decision-makers need to consider further how to reach the most marginalized learners.

EdTech may have potential for marginalized groups, particularly girls. Recent evidence indicates that even though girls may have limited access to devices, technology can be particularly beneficial to their education (EdTech Hub: Naylor & Gorgen, 2020; Webb et al., 2020). In sub-Saharan Africa and South Asia, girls and women spend more time reading on their phones than boys and men even though there is a higher number of male mobile readers (West & Chew, 2014). However, household gender roles often result in unequal access to technology. Girls may be expected to assume domestic responsibilities while boys may have greater access to computers and the internet (Pereznieto et al., 2017; Moore & Marshall, 2020). Consequently, the use of EdTech could exacerbate existing gendered digital divides (UNESCO, 2020). Strategies to overcome this risk tend to focus on access and social support (Webb et al., 2020; EdTech Hub: Naylor & Gorgen, 2020). Evidence from the Ebola crisis suggests that using multiple modalities to deliver content to — and communicate with — girls can enhance the reach of educational programs (Rafaeli, 2020). Meanwhile, local networks and community groups, some connected by technology, can play an important role in maintaining contact with girls and ensuring girls return to school (Bandiera et al., 2019).

Education providers can use technology to support learners with disabilities and special educational needs. In low-income countries, children with disabilities are less likely to attend formal education (World Health Organization, 2011). The need for greater inclusivity has become more pressing since the onset of the current pandemic (UNESCO, 2020). Broadcast media offers some advantages from this perspective. For example, learners with physical or visual impairments could engage with the audio elements of educational television programs and radio broadcasts (Bakshi, 2011). Conversely, radio programming may be inaccessible to those with hearing impairments and learners who do not speak the dominant language

(USAID, 2020). Mobile devices also offer multiple accessibility features: voice recognition, screen readers, adjustable screen displays, and different language settings (Dodson et al., 2013; Alasuutari, 2020; Comings, 2020). However, the capabilities of mobile devices are often underused (UNESCO, 2018). Education providers need to plan for those who do and do not have access to technology (EdTech Hub: Lynch et al., 2020). A range of modalities and media types, made freely available, are required to ensure that there are no accessibility gaps (Humanity and Inclusion, 2020).

EdTech needs to be sensitive to local contexts, languages, and cultural differences if it is to empower conflict-affected, displaced, and vulnerable children**.** COVID-19 has compounded an already fragile situation for marginalized and vulnerable children worldwide. Such children face significant barriers to accessing quality education, such as political barriers to their inclusion, discrimination, overstretched teachers, a lack of basic infrastructure, and pressures to abandon their education to work or marry early (USAID, 2020). EdTech interventions that proceed on the basis that inclusive and equitable education remains a right for all will best serve marginalized children (UNESCO, 2020). Specifically, EdTech interventions that combine high-, low-, and no-tech approaches, and those tailored to learners' contexts, are best placed to reduce inequities (Tauson & Stannard, 2018).

Education decision-makers can use EdTech to expand access to high-quality learning resources in low- and middle-income countries. Learners can use different EdTech modalities — openly licensed and printable learning materials, interactive radio instruction, engaging educational television — to diversify their learning experiences (Morpeth et al., 2009). In India, the Technology Tools for Teaching and Training program used interactive radio instruction and educational television to support hard-to-reach students and girls (USAID, 2010). The program reached 40 million learners and led to improved learning outcomes in English, numeracy, and environmental science (Carlson, 2013).

Concrete asks

This section highlights three 'asks' for immediate and concrete action in response to the COVID-19 pandemic and the broader learning crisis. The three 'asks' are at three different systems levels and are interrelated. Improved data collection (Ask 1) informs the design of school-based professional development programs (Ask 2) and the distribution of learning resources (Ask 3). Effective professional development programs (Ask 2) need to be part of a broader intervention, including resources that children can use to learn in school and at home (Ask 3).

1 | Expand data systems

Strengthen education systems and workforce management with digital approaches to collect and analyze school- and learner-level data to better understand needs and address inequity.

Specifically, we call on:

- Multi- and bilateral organizations, national governments, and I/NGOs to develop context-specific and comparable data collection, data analysis and data storage protocols.
- National governments to use digital platforms to collect data on educational infrastructure, enrollment and the number and geographic distribution of teachers and other members of the education workforce (by subject, language, gender).
- National governments, local governments and I/NGOs to act on this data to ensure adequate support and resources are targeted to the most marginalized students, teachers, and schools.
- All actors to extend data systems to enhance information on marginalized students and children who are out of school so that they can benefit beyond the limits of the formal school system.
- National governments to establish effective communication channels with and among the education workforce — education leadership, teachers, caregivers, learning teams — to coordinate education responses.

2 | Enhance teacher and workforce development

Enhance the quality, reach, and flexibility of school-based professional development for teachers focusing on student learning, including a wide range of holistic skills, and drawing on appropriate and cost-effective technology.

Specifically, we call on:

- National governments to promote effective means of professional development: regularly scheduled school-based professional development for school-centered learning teams (see Save Our Future background paper *Strengthening the Education Workforce and Creating Learning Teams*); professional development needs to focus on effective teaching practices for improved, active student learning and to utilize technology for coordination and communication.

- National governments, local governments, and school leaders to adopt proven approaches to using technology for professional development such as to disseminate open educational resources, facilitate peer communication, strengthen school-based communities of practice and stimulate critical reflection.
- Multi- and bilateral organizations and national governments to act on school-level data (Ask 1) to ensure teacher education programs reach teachers in the most marginalized communities.
- Multi- and bilateral organizations, CSOs, and in-country research groups to assess the impact of technology-supported, school-based teacher professional development models and to provide further evidence on effective uses of technology for teacher professional development.

3 | Promote inclusion and equity of learning outcomes

Ensure that every child can learn effectively — particularly those marginalized by poverty, gender, language, disability, or displacement — using appropriate learning and teaching resources, drawing on suitable technology where it offers value-for-money.

Specifically, we call on:

- Multi- and bilateral organizations and national governments to invest in better understanding where technology can impact learners at all levels, inside and outside of schools, as described in SDG4.
- Multi- and bilateral organizations, national governments, and the private sector to support new investments to reach the diversity of learning populations to enhance learning outcomes, including the development of a range of holistic skills.
- National governments to use open curricular content and to ensure that there will be low- or no-cost ways for teachers, parents, and students to access content digitally, offline, through radio, through television, or in print.
- Multi- and bilateral organizations, national governments and the private sector to co-create mechanisms to share openly licensed, printable and editable content for the core curriculum including teacher guides, structured lesson plans, textbooks, workbooks, teacher professional development materials, and other multimodal resources in accessible, user-friendly formats and local languages, and targeted by learner level, for use inside and outside of the classroom.

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