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INFORMATION AND COMMUNICATION TECHNOLOGY FOR EDUCATION (ICT4E) HOW-TO NOTE

How-To Notes provide additional design and implementation suggestions not covered in existing USAID Policy documents related to sub-areas of the Education Strategy.

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FOREWORD

Colleagues,

This ICT4E How To Note is intended to provide a useful framework for USAID staff to develop and support information and communications technology for education (ICT4E) components in USAID projects. It is designed as a companion piece to the [*First Principles: Designing Effective Education Programs Using Information and Communication Technology \(ICT\): Compendium*](#) (USAID, 2011). As did the First Principles Compendium, this publication draws from my role as the Agency’s Senior Education Technology Specialist since 2009 and prior experiences, including at Peace Corps and the World Bank, managing and providing support for a variety of international ICT4E and other ICT for sector development activities.

Even with the growing body of evidence of the impact and dynamic nature of technological innovation and application in education, particularly in more advanced economies, there is still much we don’t know about the use of ICT4E in lower-resource settings. Nevertheless, in the publication that follows, we’ve provided citations, research, and project examples that we hope you will deem valuable for making informed decisions about and supporting USAID ICT4E investments.

Please consider this a “living” document, and let us know if there are other resources that we might include in future iterations.

Anthony Bloome, USAID Senior Education Technology Specialist

I. PURPOSE AND USE

This How-To Note is one in a series, created by USAID's Bureau for Economic Growth, Environment and Education's Office of Education (E3/ED), to assist USAID education staff and implementing partners with integrating four critical, cross-cutting areas into USAID education projects and activities: gender, disability inclusive education, education finance, and information and communication technology for education (ICT4E). The How-To Notes offer guidance for addressing these cross-cutting areas across USAID Education Policy priorities; it applies to education programming across all levels (from pre-primary through higher education), contexts (stable contexts to crisis and conflict-affected environments), settings (formal and non-formal), and providers (state and non-state).

I.1 Structure of this How-To Note

Section 1, explains the purpose and use of this How-To Note. **Section 2** provides a short introduction to why we are excited by ICT4E and a quick digest of key resources, applications, and initiatives highlighted throughout the paper. **Section 3** provides background context to USAID's historical and current ICT4E investments. **Section 4** provides key definitions of terminology frequently used to discuss ICT4E. **Section 5** presents the 10 key principles to which USAID adheres when conceptualizing, designing, and implementing ICT in education systems. **Section 6** provides a condensed description of the growing body of evidence for ICT4E around the world and provides useful sites and resources as reference.

Section 7 offers an extended examination of the opportunities for technology to support challenges within the education system and resources to help education staff and implementing partners understand and clearly communicate the case for integrating ICT approaches into associated education activities. **Section 8** contains a matrix that education staff and implementing partners can use to integrate ICT at various stages of the USAID Program Cycle. It begins with country strategic planning and moves into project and activity planning, design, and implementation phases. The matrix also contains guidance for ensuring that monitoring, evaluation, and learning capture how interventions are performing according to established goals and targets for ICT usage. Finally, **Section 9** contains a listing of supplementary resources that will be useful to USAID education staff and implementing partners for ICT integration at all stages of the Program Cycle.

Annex A provides examples of ICT4E integration in recent USAID education projects and activities around the world. **Annex B** provides USAID ICT4E highlights of digital literacy activities in 2018. **Annex C** contains recent examples demonstrating how ICT4E was integrated into USAID education sector solicitation documents for new projects and activities. **Annex D** presents samples of ICT4E learning agenda questions from the recent work of USAID E3/ED teams. **Annex E** contains a glossary of ICT4E terms for reference.

I.2 Using this How-To Note

This How-To Note offers recommendations, country examples, and other resources that can support education staff and partners at different phases of the Program Cycle. It also includes ICT4E good practices, key policies, and research relevant to the types of education projects and activities USAID funds. The contents of this How-To Note have various potential uses, e.g., as a vehicle for training, as a reference for policy dialogue, and as a source of talking points and practical tools to assist Education

Officers and implementing partners in designing, implementing, monitoring, and evaluating projects and activities.

Given that research and the evidence base are constantly evolving, education staff can supplement the resources identified in this How-To Note by calling upon E3/ED and regional technical staff to provide expertise and guidance. These staff can assist in identifying evidence and good practices as needed for a particular project or activity. They can support work at all stages of the Program Cycle, including planning, design, implementation, and monitoring and evaluation. Many of the resources referenced in this document, as well as other education-related guides, tools, and templates, are on USAID's [EducationLinks](#) website.

2. INTRODUCTION

Technology is not a single intervention, but rather an ever-growing set of tools. Well-conceived uses of a broad array of locally appropriate and inexpensive technologies, including radio, mobile phones, computers, low-cost projectors, the Internet, and other tools, can complement and strengthen education reform efforts.

These tools can target different actors and barriers within an educational value chain. Broadly speaking, these interventions can be divided amongst two camps: those that can be used to **strengthen efficiencies in educational systems** and those that directly **serve learners** in traditional and non-traditional educational settings to improve academic performance.

The former includes using technologies to develop content, and collect, collate, and share administrative, assessment, and testing data in order to facilitate teacher professional development, and streamlining the processing and receipt of financial payments throughout the educational system. The latter includes a broad range of technologies through which learners are accessing content and/or creating their content.

What makes investment decisions about ICT4E so challenging, particularly in low-resource settings, is that as with other interventions, they are just one component of a complex educational system and not yet supported by a robust and rigorous body of evidence. Policymakers—and those who advise them—often rely on promising practices and anecdotes to inform their investment decisions rather than having more substantive cost-effective analysis to draw upon. Compounding this challenge is the dearth of analytical work comparing various technologies against each other and with non-technology supported interventions.

Notwithstanding these challenges, a range of technologies, such as mobile phones, have become increasingly ubiquitous in many of the communities where USAID works and have become exponentially less expensive for educational authorities and learners to access. To take just one example, USAID supported the *Last Mile Initiative* from 2005-2008 designed to extend ICT service and connectivity in low-resource communities. In 2019, in most communities where USAID works now, there is mobile service provision and most households own a mobile phone.

The blog [What's changed: Ten reflections on ten years of technology use in education](#) (2016) by Michael Trucano of the World Bank provides insights into important ICT4E trends over the last decade.

Why Are We Excited About the Use of ICTs?

Significant contributions to economic growth: There are millions of children in developing countries who do not have access to schooling and are not being taught the basic skills that they require to be competitive economic actors in a globalized world. This lamentable state of education is compounded by their limited connection to ICT, a potential enabler that can improve the educational and economic development of a country. Research has demonstrated a link between ICT provision and economic growth. For example, a recent study found that fixed broadband (high-speed data transmission not delivered through a mobile carrier) has had a significant impact on the world economy during the last seven years (2010-2017). An increase of 1 percent in fixed/landline broadband¹ coverage yields a 0.08 percent increase in GDP.²

Accelerate progress toward UN Sustainable Development Goal 4 (SDG 4): Few societies have achieved high and sustained rates of growth or significantly reduced poverty without first investing in expanding access to quality education. The use of ICT is and can support all seven of the SDG 4 outcome targets, including facilitating the delivery of instruction or learning materials to primary and secondary learners and teachers; improving the efficiency, quality, and utility of education data; delivering higher education and workforce development learning materials to increase employment prospects; and advancing equal access at all levels of education and vocational training for the vulnerable, including persons with disabilities, indigenous peoples, and children in at-risk situations.³

Advance the acquisition of digital literacy skills: Digital literacy skills are essential for finding information and communicating in today's world. SDG target 4.4 is expressed as follows: "By 2030, substantially increase the number of youth and adults who have relevant skills, including technical and vocational skills, for employment, decent jobs and entrepreneurship." The SDG indicator 4.4.1 further defines this as the "Proportion of youth and adults with information and communications technology (ICT) skills, by type of skill." UNESCO's Global Alliance to Monitor Learning is developing a [framework of digital literacy skills and competencies](#) that will enable countries and UN entities to monitor and assess progress in advancing digital literacy.

3. USAID'S COMMITMENT TO ICT FOR EDUCATION (ICT4E)

Innovation is making the impossible, possible, the unsolvable, solvable. And of course, nowhere is this more true than in the area of international development, where technology and new thinking are enabling us to reinvent how we go about fulfilling our mission.

USAID Administrator Mark Green, September 2017

USAID's leadership in using ICT to drive outcomes in education has deep roots, tracing back to the use of radio as early as the 1970s to provide distance learning for hard to reach populations. As seen in the

¹ In telecommunications, broadband is wide bandwidth data transmission that transports multiple signals and traffic types. The medium can be coaxial cable, optical fiber, radio, or twisted pair. In the context of Internet access, broadband is used to mean any high-speed Internet access that is always on and faster than dial-up access over traditional analog or ISDN PSTN services.

² See Raul Katz and Fernando Callorda, "The economic contribution of broadband, digitalization and ICT regulation," International Telecommunication Union (ITU), 2018, pg. 31, https://www.itu.int/en/ITU-D/Regulatory-Market/Documents/FINAL_Id_18-00513_Broadband-and-Digital-Transformation-E.pdf.

³ UNESCO Institute of Statistics, Quick Guide to Education Indicators for SDG 4, 2018

case study examples and Annexes that follow, USAID is continuing to invest in a broad array of technologies to support many of our education sector objectives from early grade instruction, to supporting learners with disabilities, to providing educational content in challenging educational environments, and to provide youth with useful employment skills. The Agency has also taken a number of steps in the last decade to reinvigorate science and technology across its many operations, including advancing partnership opportunities with researchers and scientists at higher education institutions and building upon an increasing penetration of technologies and access to information that these can bring in the countries and communities where it works. The fast-changing landscape of technological innovation has profound implications for the Agency's global development work supporting educational service delivery in both high and low-resource settings. In concert with the potential and excitement of capitalizing on these resources, the Agency has also encouraged an evidence-based integration of appropriate, cost-effective ICT to support program outcomes across the Agency's education goals.

At the **Agency level**, USAID's work in education is shaped by the U.S. Congress' passage of the [*Reinforcing Education Accountability in Development \(READ\) Act*](#) in 2017 to demonstrate the United States Government's (USG) commitment to helping ensure that individuals around the world have the education and skills needed to be productive members of society. The READ Act led to the development of a comprehensive, integrated USG strategy to promote basic education. The [*U.S. Government Strategy on International Basic Education \(Fiscal Years 2019 - 2023\)*](#) focuses on harnessing technology and innovation: "Where a technology-based solution makes sense given country needs and context, the USG will work to identify, implement, test, and scale up that solution."⁴ The [*USAID Education Policy*](#) lays out ways in which leveraging technology can support the principles and priorities that contribute to the primary purpose of USAID programming in education: to achieve sustained improvements in learning outcomes and skills development. The USG Education Strategy and USAID Education Policy also stress the importance of USAID working with a variety of innovative financing and through diverse public and private sector partnership modalities to achieve identified goals. These modalities are underscored in the Agency's [*Acquisition and Assistance Strategy*](#), which emphasizes that "[W]e will create opportunities to forge new partnerships, leverage private resources, and tap into innovative solutions that expand our approaches with the intent of finding the right partners for the right activities," USAID's current and future relationships with technology-focused researchers and service and platform providers will offer fruitful opportunities for education program impact, replication, and scale. The Agency has also prepared a new [*Digital Strategy*](#) that charts an Agency-wide vision for development and humanitarian assistance in the world's rapidly evolving digital landscape.

At the **global level**, USAID's work in ICT4E is a demonstration of both the convening power of the Agency as well as the high-level of interest in this space across a spectrum of donor, international NGO, and private-sector organizations. USAID is committed to promoting effective education practices and ongoing research and innovation to improve the evidence base. ICT can play a critical role as a tool to enable scale, as well as to promote digital literacy in line with the [*UN Sustainable Development Goals*](#) (SDGs). The SDGs focus the global education community on improving learning outcomes through partnerships, evidence-based research, technology, and innovation.

⁴ U.S. Government, "U.S. Government Strategy on International Basic Education (Fiscal Years 2019 - 2023)," 2019, pg. 28, https://www.usaid.gov/sites/default/files/documents/1865/USG-Education-Strategy_FY2019-2023_Final_Web.pdf.

Importance of Partnerships

Recognizing that USAID has limited capacity to address global challenges when acting alone, the Agency is focusing on partnerships that leverage its impact and programmatic effectiveness in science, technology, and innovation.⁵

Achieve greater impact through partnerships: Given the complexity of local and national educational challenges, proactive ICT4E partnerships can amplify and accelerate the opportunities for multifaceted solutions. In addition to leveraging the technical expertise and experiences across government agencies, there is enormous potential for educational stakeholders to partner with and/or facilitate the establishment of robust linkages with private, non-profit, and public sector organizations working in and/or interested in supporting education. For example, education programs can benefit from partnerships with hardware manufacturers, communication providers (e.g. mobile carriers) and software application developers, including those exploring the educational gaming space, to jointly research, pilot, and explore opportunities for replication and scale of promising interventions. These efforts can be used to strengthen educational systems to improve data collection, support the delivery of instruction in traditional and non-traditional settings, and provide access to employability skills relevant to market needs. One concrete example is The Global Business Coalition for Education, which has a [diverse membership](#) combining efforts with national stakeholders on youth skills and early childhood development. Within USAID, some Missions are collaborating with Orange, a global mobile provider, and its national affiliates to connect teachers in “virtual networks” to and through user-friendly messaging-based applications to improve reading instruction. In Zambia, a USAID implementing partner worked with a local radio station and mobile provider to source and broadcast traditional stories to support early grade reading instruction.

The following are examples of USAID partnerships that support ICT4E:

- [The All Children Reading: A Grand Challenge for Development](#) was launched in 2011 by USAID, World Vision, and the Australian Government. The All Children Reading Grand Challenge for Development is an ongoing series of competitions that leverages science and technology to identify, catalyze, and apply scalable technology-based solutions to improve the literacy skills of early grade learners in developing countries.
- USAID is a founding member of the [Mobiles for Education Alliance \(mEducation Alliance\)](#) network. The Alliance serves as a convening platform for leading global stakeholders, including donors, to share their experiences concerning technology for education investments, particularly in lower-resource developing countries. Among other activities, the Alliance hosts an annual symposium that brings together policymakers and practitioners from around the world.
- [The Principles for Digital Development](#) are nine living guidelines (not limited to the education sector) that are designed to help integrate best practices into technology-enabled programs. USAID, primarily through their Global Development Lab, was a part of the community-driven

⁵ National Academies of Sciences, Engineering, and Medicine, *Review of Science, Technology, Innovation, and Partnership (STIP) For Development and Implications for the Future of USAID*, Washington, DC: The National Academies Press, 2017, <http://sites.nationalacademies.org/pga/dsc/stip/index.htm>.

effort to create the Digital Principles beginning in the late 2000s. While several principles are germane to most well-designed education projects—e.g., designing with the user, building in sustainability in early design, and designing for scale—there are specific principles quite relevant to technology-supported initiatives. For example, USAID’s support for the [Global Digital Library](#) (GDL) (referenced below) is a tangible demonstration of two digital development principles—use of open source and use and reuse of existing materials—as the GDL is an online, openly accessible platform of local language, early grade reading materials.

- Several global educational advocacy and financing platforms, including the [Global Business Coalition for Education](#), aim to strengthen education systems in developing countries. They have recognized the importance of evidence-based investments in technology within their global education efforts; ICT4E is discussed in meetings, research studies, blogs, webinars, and other events.
- USAID is a founding member of [The Global Book Alliance](#), a partnership of donor agencies, multilateral institutions, and civil society organizations that are committed to bringing books to every child in the world by 2030. The [Global Digital Library](#) is a signature initiative of the Global Book Alliance; it provides free online access to high-quality books for print and digital use as well as adaptation. The GDL provides books in 15 languages and will offer titles in more than 100 languages by 2020.

4. DEFINITIONS

Given the rapidly changing nature of technological advances, this section contains a small number of core terms relevant to current information and communications technology for education (ICT4E) work in the USAID context. Annex E of this How-To Note contains a glossary and references offering a more complete listing of ICT4E-related terms.

Information and communication technologies (ICT) includes a diverse set of technological tools and resources used to transmit, store, create, share, or exchange information.⁶ Examples of ICT tools and resources include computers, the Internet (websites, blogs and emails), intranets, wireless networks, live broadcasting technologies (radio, television, and webcasting), recorded broadcasting technologies (podcasting, audio and video players, and storage devices) and telephone technologies (fixed or mobile, satellite, video-conferencing). While this description is wide in scope, it recognizes that ICT encompasses a larger process of gathering, creating, and disseminating information.

Information and Communications Technologies for Education (ICT4E) encompasses the same set of tools and applications identified for ICT, but with specific application for uses in education.

Information Technology is the use of computers to store, retrieve, transmit, and manipulate data, or information, often in the context of a business or other enterprise. IT is considered a subset of information and communications technology (ICT).

⁶ UNESCO Institute for Statistics, “*Guide to Measuring Information and Communication Technologies in Education*,” 2009, pg. 120 https://www.itu.int/ITU-D/ict/partnership/material/ICT_Guide_EN.pdf

Hardware is the physical support used for electronic or digital survey purposes.⁷

Software refers to the programs that allow for performing tasks and processes on these physical supports.⁸

Broadband is high-speed, always-on Internet connectivity.⁹ It began to appear in some high-income countries in the late 1990s, using the copper wire in ordinary telephone connections (i.e., digital subscriber line (DSL)) or the coaxial cable in cable television networks (i.e., cable modem). In 2001, the first high-speed mobile networks were launched.¹⁰ Broadband has driven widespread changes in the IT sector, enabling services such as cloud computing and mobile apps. Broadband includes several high-speed transmission technologies such as DSL, cable modem, fiber, wireless, satellite, and broadband over powerlines (BPL).¹¹

Fixed broadband¹² is high-speed data transmission to homes and businesses using technologies such as T1, cable, DSL, and fiber optic services.

Mobile broadband¹³ is data transmission delivered by cellular carriers to mobile devices (cellphones, smart phones, tablets, laptops). Speeds are typically less than high-speed fixed broadband subscriptions such as cable and FiOS. However, 4G LTE cellular service increasingly competes with DSL, low-speed cable, and satellite offerings.

Broadband penetration is the number of broadband subscribers per 100 inhabitants in a location.¹⁴ The subscriber data measured includes the total number of both business and residential subscriber lines.

Blockchain¹⁵ is a new technology that has the potential to have a large impact on the self-publishing industry; it is the technology that runs Bitcoin. Blockchain, in essence, is a computer program that works by distributing data, such as in the case of managing electronic currency, without a central administrator. In the future, Blockchain could prove to be a technology that changes the way ebooks are distributed, and possibly challenge the monopolies that ebook retailers currently hold in the market.¹⁶

⁷ Vanessa Corlazzoli, "ICTs for Monitoring and Evaluation of Peacebuilding Programmes," DFID, May 2014, <https://www.sfcg.org/wp-content/uploads/2014/05/CCVRI-SSP-ICT-and-ME-Final.pdf>

⁸ Ibid.

⁹ Raul Katz, "Impact of Broadband on the Economy," ITU, April 2012, https://www.itu.int/ITU-D/treg/broadband/ITU-BB-Reports_Impact-of-Broadband-on-the-Economy.pdf

¹⁰ Michael Mingos, "World Development Report 2016: Digital Dividends, Exploring the Relationship Between Broadband and Economic Growth," World Bank, January 2015, <http://documents.worldbank.org/curated/en/178701467988875888/pdf/102955-WP-Box394845B-PUBLIC-WDR16-BP-Exploring-the-Relationship-between-Broadband-and-Economic-Growth-Mingos.pdf>

¹¹ Federal Communications Commission, "Types of Broadband Connections," accessed November 2019, <https://www.fcc.gov/general/types-broadband-connections>

¹² PCmag.com, "Definition of fixed broadband," accessed November 2019, <https://www.pcmag.com/encyclopedia/term/59851/fixed-broadband>

¹³ PCmag.com, "Definition of mobile broadband," accessed November 2019, <https://www.pcmag.com/encyclopedia/term/60017/mobile-broadband>

¹⁴ OECD, "Broadband Portal," accessed November 2019, <http://www.oecd.org/sti/broadband/broadband-statistics/>

¹⁵ Derek Haines, "Blockchain, Bitcoin, Ebooks and Self-Publishing," Updated December 30, 2018, <https://justpublishingadvice.com/blockchain-bitcoin-ebooks-and-self-publishing/>

¹⁶ Ibid.

Digital competence involves the confident, critical, and responsible use of, and engagement with, digital technologies for learning, at work, and for participation in society. It includes information and data literacy, communication and collaboration, media literacy, digital content creation (including programming), safety (including digital well-being and competences related to cybersecurity), intellectual property-related questions, problem solving, and critical thinking. The European Commission’s [DigComp 2.1: Digital Competence Framework For Citizens](#) is well-regarded resource outlining eight digital competence proficiency levels.

Digital literacy¹⁷ is the ability to access, manage, understand, integrate, communicate, evaluate, and create information safely and appropriately through digital devices and networked technologies for participation in economic and social life. It includes competencies that are variously referred to as computer literacy, ICT literacy, information literacy, and media literacy.

Open educational resources are freely accessible, openly licensed text, media, and other digital assets that are useful for teaching, learning, and assessing as well as for research purposes.

5. ICT4E: TEN KEY PRINCIPLES

USAID is among the world’s largest bilateral investors in ICT projects for education. Such projects use technology to increase access to basic education; to support the development of literacy and numeracy skills; to improve the management of schools and education systems; to enhance the relevance and quality of learning; and to extend educational opportunities to marginalized and vulnerable populations, including those in crisis and conflict environments.

Once thought of as merely desktop computers with fixed-line Internet connectivity, ICT has expanded to include many different types of devices and pathways for introducing technology into schools—with positive results. ICT integration has shown to increase student motivation, promote change in classroom practices, and support other improvements in education systems.

USAID adheres to **ten key principles** when conceptualizing, designing, and implementing ICT in education systems.¹⁸

1. **Use ICT to support education and development goals.** Technology can be used to address areas where system capacity is poor, schools are underperforming, or there are gaps in student learning. A well-designed technology solution can be used to disseminate resources, connect students to information, enhance teachers’ practices and students’ performance in all subject areas, improve school management, and support data-driven policymaking.
2. **Use ICT to enhance student knowledge and skills.** If schooling is intended to be relevant to work and important to a society, success in school should be accompanied by the development of a broad body of knowledge and a complete range of skills—including socio-

¹⁷ Manos Antoninis and Silvia Montoya, “A Global Framework to Measure Digital Literacy,” Data for Sustainable Development, UNESCO Institute for Statistics Blog, March 19, 2018, <http://uis.unesco.org/en/blog/global-framework-measure-digital-literacy>

¹⁸ Examples of USAID programs and activities illustrating each of these principles can be found on the USAID EducationLinks website, at <https://www.edu-links.org/learning/10-principles-developing-ict-education-programs>.

emotional learning (SEL), literacy, numeracy, information literacy¹⁹ and independent-learning skills that contribute to achievement in later life. ICT could be used to help students build these skills.

3. **Use ICT to support data-driven decision making.** Regular and reliable data are essential to planning and policy, financial management, management of school facilities, decisions about school personnel (including teachers), and support for student learning.
4. **Include all short- and longer-term costs in budget planning.** Estimating full capital and operating expenses of technology projects in schools requires consideration of all equipment and activities needed to ensure that hardware (and software) are installed, operated, maintained, repaired, and replaced, and that teachers and other personnel have the skills and resources they need to use their new tools to meet project goals.
5. **Explore technology alternatives to find appropriate solutions.** The proliferation of new tools and new approaches is accelerating in all countries; these innovations challenge project developers to think creatively about emerging opportunities. Program designers should consider alternative ways of meeting proposed educational objectives, including broadcast or other technologies, low-cost/low-power computers, and mobile telephones.
6. **Focus on teacher development, training, and ongoing support.** In-service teacher professional development is frequently among the most important and complex components in an education technology project. Teachers are essential to student learning outcomes.
7. **Explore and coordinate involvement of many different stakeholders.** It is vital to engage multiple stakeholders in education technology projects, as they frequently cut across several sectors and entail great expense as well as technical and organizational complexity. International and local organizations can make valuable contributions, e.g., donor agencies, charitable foundations, NGOs, private-sector technology firms, government agencies, and ministries of education.
8. **Develop a supportive policy environment.** Establishing policies, plans, and central agencies to shape the use of technology in education can help ensure that initial expenditures and activities support government objectives and that high-impact activities receive ongoing funding.
9. **Integrate monitoring and evaluation into project planning.** Planning (and budgeting) for monitoring and evaluation of education-technology projects should begin during the first phase of project design. In most circumstances, it is important to use randomized studies and experimental statistics; such methods typically require collecting baseline data or data from control-group samples. Advanced planning, budgeting, and preparation are essential if these measures are to be put in place.
10. **“It takes capacity to build capacity”—System strengthening precedes system transformation.** Developing-country school systems rarely have the capacity to effect substantial change in teaching, learning, or school operations—whether technology is used or

¹⁹ The American Library Association defines “information literacy” as a set of abilities requiring individuals to “recognize when information is needed and have the ability to locate, evaluate, and use effectively the needed information.”

not. Schools and school systems that lack basic levels of management, leadership, teacher professionalism, resources, and other core components must build the stable foundation needed for the equitable and effective delivery of public education.

6. EVIDENCE

“It has become clear that technology does not lead to improved outcomes when introduced in isolation: the chance of positive impact is significantly increased when technology is one component within a holistic, integrated investment in improving education.”²⁰

Harnessing technology for teaching and learning offers huge opportunities to transform education at all levels. By 2020, 2.6 billion people will have smart phones, and 56 percent of people will have Internet access.²¹ Digital learning makes it possible to reach new and excluded learners, lower costs, enhance teaching, and offer new ways for all learners to gain skills.

There are many digital platforms and resources that are being used in education in different contexts and therefore it is not easy to make generalizations about the overall effectiveness of such technologies.²² It can be daunting to know where to start for researchers, practitioners, and donors looking to gain a basic understanding of the sector. Nevertheless, there is a growing body of evidence on ICT4E interventions from around the world.

When contemplating the use of ICT4E interventions, the **development challenge** and the **specific country context** are the two key concepts that drive intervention solutions. Evidence is critical for determining whether and how the use of ICT4E is appropriate, and if it is appropriate, how it can be employed to meet the needs of the situation at hand. There is no one-size-fits-all solution; an ICT intervention can be appropriate and effective for one purpose and inappropriate for another. It can be cost-effective in one context and not in another. Evidence enables USAID education staff and implementing partners to have a solid foundation for determining the potential benefits and risks that use of ICT4E can have.

E3/ED commissioned a [Synthesis of Findings and Lessons Learned from USAID-Funded Evaluations: Education Sector 2013–2016](#) (2018), as well as a quality assessment of those evaluations. The study brought forward the strongest evidence that could be used to inform future USAID education programming. The general findings (see p. 108 of the report for a general findings synthesis as it relates to ICT4E) underscored the use of ICT-related solutions for instructional purposes, scaling of Education Management Information Systems (EMIS), employment services, education management, professional networking, and as a means to increase student engagement with school and promote school retention. However, a range of technical and design difficulties in getting the systems to work as intended were reported and maintenance was cited as an ongoing issue with computers (although mobile phone technologies were deemed promising). The study team recommended conducting qualitative research to

²⁰ C. Muyoya, M. Brugha, and D. Hollow, “Education technology map: guidance document,” Jigsaw Consult, United Kingdom, 2016, <https://www.gov.uk/dfid-research-outputs/education-technology-evidence-map>

²¹ International Commission on Financing Global Education Opportunity, *The Learning Generation: Investing in education for a changing world: A Report by The International Commission on Financing Global Education Opportunity*, 2016. See especially pg. 76-81, Recommendation 5. Harness Technology for Teaching and Learning, <http://report.educationcommission.org/report>

²² For more on the issue of challenges in finding evidence regarding ICT use in education, see Tim Unwin’s blog at <https://unwin.wordpress.com/2018/07/16/why-we-dont-really-know-very-much-about-the-influence-of-icts-on-learning-and-education/>

identify the technical issues hampering the adoption of ICT-related solutions, quantitative research to measure the impact and cost-effectiveness of these investments in comparison to alternatives such as face-to-face training, and further consideration of the usefulness of the selected technologies given the intervention modality and environment where it would be deployed during the activity design phase.

Section 8 of this How-To Note, “Integrating ICT4E into the Program Cycle,” contains guidance for monitoring and evaluation (M&E) of ICT4E projects and activities, including assessment of impact and guidance for establishing strong M&E systems from the earliest stages of project and activity design.

The following sites and resources contain useful ICT4E background reference material for general ICT4E and thematic specific applications (e.g., teachers, reading, crisis and conflict settings):

General Resources

- The World Bank’s [Systems Approach for Better Education Results \(SABER\)-ICT](#) website has tools and resources for analyzing policy, project and activity implementation, and knowledge sharing, but notes that there is insufficient data to make assertions about the impact of ICT in education.
- [The World Development Report 2016: Digital Dividends](#) concludes that the full benefits of ICT potential will not be realized unless countries continue to improve their business climate, invest in people’s education and health, and promote good governance. In countries where these fundamentals are weak, the report finds that digital technologies have not boosted productivity or reduced inequality. Countries that complement technology investments with broader economic reforms reap digital dividends in the form of faster growth, more jobs, and better services. With specific reference to [evidence of technology impact](#) in the education sector, the authors note that:

The evidence base for investments in educational technologies in middle- and low-income countries is weak, but growing. Until recently, there were few rigorous randomized studies on the impact of investments in educational technologies that could inform related policy decisions; now there are almost two dozen. In addition, a significant body of practical evidence has also been collected based on experiences in middle- and low-income countries. Characteristics of many successful technology-enabled educational projects in such places include:

- A focus on the “guided use” of technology, and not just providing tools for general use;
- Providing relevant curricular materials;
- The shared use of devices in school settings;
- Attention to pedagogy, teacher support, and development;
- Using technologies in ways that are supplemental and practical; and,

- Using evaluation mechanisms that go beyond outputs.²³
- A 2017 publication, [Education Technology: An Evidence-Based Review](#), from the National Bureau of Economic Research synthesizes key evaluation findings from rigorously reviewed ICT4E interventions across four categories of education technology: 1) access to technology, 2) computer-assisted learning, 3) technology-enabled behavioral interventions in education, and 4) online learning. While the randomized control trials examined primarily took place in developed countries, key findings, including promising areas of replication and future research, are quite relevant for work in lower-resource settings. For example, some of the most successful and cost-effective interventions were focused on supporting behavioral interventions of parents with their children using low-cost text messaging to source information on student performance and prompt greater dialogue with their children.
- Findings from [Improving Learning in Primary Schools of Developing Countries: A Meta-Analysis of Randomized Experiments](#) by Patrick McEwan (2015), based on 31 of the 77 reports reviewed, show gains from computers and other technology to be lower than was found for U.S. domestic applications, but to be more effective than other types of interventions studied. The review of technology treatments starts on page 354. The use of technology as a category in this review is relatively broad, but it serves as a good starting point for finding rigorous studies.
- [What Really Works to Improve Learning in Developing Countries?: An Analysis of Divergent Findings in Systematic Reviews](#) by David Evans and Anna Popova (2015) reviews six systematic reviews and meta-analyses, including the McEwan study (noted above). It notes that McEwan’s overly broad use of “computers and technology” to categorize interventions is less useful for understanding what works. Instead, researchers should narrow their search for evidence within the ICT intervention approach, to see what best suits a particular context and need. Key findings start on page 12, but researchers particularly highlighted significant improvement from computer-assisted learning (CAL), which can adapt to the student’s learning level and/or can be used to support formative assessment and individualized and targeted instruction. One example of this is the teacher-led adaptive instruction for the Early Grade Reading Assessment program in Liberia evaluated by Piper and Korda (2011), in which students’ reading levels were evaluated using a tablet-based diagnostic exam, and teachers were then trained in how to continually assess student progress.
- The [mEducation Alliance Evidence Showcase webpage](#) compiles rigorous, innovative, and relevant ICT4E evaluations. The page showcases recent examples of important research covering evidence in ICT4E usage across a variety of needs and uses.
- Also on the mEducation Alliance website, the [ICT4E Evidence Starter Kit](#) provides more studies and other helpful links for learning about the evidence of ICT4E impact. The selected studies illustrate the breadth and depth of ICT4E research. While the list is by no means exhaustive, it provides a sense of the rigor applied to ICT4E evaluations.

²³ Elena Arias Ortiz and Julián Cristia, “The IDB and Technology in Education: How to Promote Effective Programs?,” Washington, DC: Inter-American Development Bank, 2014.

ICTs and Teachers

- Supporting teachers with coaching and mentoring is one of the best evidence-driven investments and is highlighted in [The Effect of Teacher Coaching on Instruction and Achievement: A Meta-Analysis of the Causal Evidence](#) (Kraft et. al., 2017). This U.S.-focused publication references several ICT-supported interventions, such as video libraries providing teachers with video recordings of other teachers' classroom instruction that served a core function in teachers' conversations with their coach (p. 15). In lower-resource settings, such as in South Africa, there is also evidence of the value of technology use to support teacher coaching. Researchers in [Alternative forms of early grade instructional coaching: Emerging evidence from field experiments in South Africa](#) (Kotze et. al., 2018) compared the effectiveness of on-site coaching to "virtual coaching" (e.g., utilizing instant messaging, one-on-one text messaging, and telephone calls to support teachers) and found no significant differences in impact. One virtual coach was able to do the same work as three on-site coaches; this raises exciting opportunities to significantly scale this technology to support many teachers.

Early Grade Reading

- [The All Children Reading \(ACR\) Grand Challenge for Development's research pages](#) contains links to research, evaluations, and studies that practitioners can access depending on the type of intervention in question. ACR's [Project Reports](#) page has both external evaluations of ACR grantees as well as full, end-of-project reports. Examples of evidence found here include external evaluations of early grade reading pilots and summary reports detailing the overall impact of technology to address children's reading needs in and out of school, the impact of family and community engagement, and the use of EdTech for literacy focused on children with sensory disabilities.

In the Round 2 [endline summary report](#), the authors noted that while all ACR GCD Round 2 projects indicated improvements in students' reading skills from baseline to endline, it was unclear from the observed project interventions if the observed magnitudes of changes in students' reading skills were meaningful in practical terms—in other words, it is unclear if the improvements were great enough to contribute to students' ability to become readers. The authors noted that further exploration into reading benchmarks in each language would contribute to a better understanding of what thresholds should be met to practically improve reading skills. Analyses showed that no single contextual factor was associated with improved learning outcomes across projects, although small sample sizes may have reduced the ability to detect these correlations.

Education in Crisis and Conflict Settings

- Tuft University's 2016 working paper entitled [Technology for Evaluation in Fragile and Conflict Affected States: An introduction for the digital immigrant evaluator](#) offers a five-step decision filter that can help evaluators to ascertain when to use technology for education evaluations in conflict and crisis contexts. Save the Children's report [EdTech for Learning in Emergencies and Displaced Settings: A rigorous review and narrative synthesis](#) (2018) amasses evidence to develop a nuanced understanding of what is required to implement effective and ethical EdTech programs that lead to children learning, asking the research question: How can the utilisation of EdTech

(at home or at school) for teaching and learning best facilitate the learning process of children in crisis-affected settings?

- The following resources written for education in crisis and conflict contexts are also useful to help identify ICT tools/interventions in non-crisis situations: [*Checklist for Information and Communications Technologies \(ICT\) Interventions to Support Education in Crisis and Conflict Settings* \(2018\)](#) and [*Technology for Evaluation in Fragile and Conflict Affected States: An introduction for the digital immigrant evaluator, Working Paper* \(2016\)](#).

7. ICT4E CHALLENGES AND OPPORTUNITIES

The benefits that ICT4E offers must be balanced with careful thought about challenges to its design and implementation within an activity. Below are a few of these major challenges and associated opportunities for informed ICT4E investments. Each challenge is followed by a list of opportunities in the form of citations for resources, guidance, tools, and evidence, indicating where those designing and implementing ICT4E activities may go to learn more about how to address that particular challenge.

CHALLENGE - LACK OF RIGOROUS ASSESSMENT OF IMPACT AND EVIDENCE

Until recent years, most of the focus of ICT4E assessment had been on inputs (such as number of computers deployed to a school) and outputs (such as number of teachers trained how to use technology) and there was relatively limited focus on outcomes (such as a change in student numeracy levels as a result of using technology).²⁴ ICT4E investors often assume that the introduction of technology into education will necessarily lead to educational improvements. Many consumers of technological interventions—policymakers, administrators, teachers, and parents—fail to account for critical variables such as school funding, teacher preparedness, educational philosophy, or technical infrastructure. In addition, many ICT4E designers create technological interventions without fully understanding the educational systems into which they will be introduced.

OPPORTUNITIES

- E3/ED commissioned [*Synthesis of Findings and Lessons Learned from USAID-Funded Evaluations: Education Sector 2013–2016*](#) (2018), as well as a quality assessment of those evaluations. The study brought forward the strongest evidence that could be used to inform future USAID education programming. The general findings (see p. 108 of the report for a general findings synthesis as it relates to ICT4E) underscored the use of ICT-related solutions for instructional purposes, scaling of EMIS systems, employment services, education management, professional networking, and as a means to increase student engagement with school and promote school retention. However, a range of technical and design difficulties in getting the systems to work as intended were reported and maintenance was cited as an ongoing issue with computers (although mobile phone technologies were deemed promising). The study team recommended conducting qualitative research to identify the technical issues hampering the adoption of ICT-related solutions, quantitative research to measure the impact and cost-effectiveness of these investments in comparison to alternatives such as face-to-face training, and further consideration

²⁴ Op.cit. Muyoya et.al., 2016

of the usefulness of the selected technologies given the intervention modality and environment where it would be deployed during the activity design phase.

- The [All Children Reading website](#) provides [landscape reviews](#) that identify major ICT4E trends, patterns, knowledge gaps, and lessons learned about technology and early grade literacy in developing countries. The site also contains [project evaluations](#) that include reports detailing topics such as the overall impact of technology to address children’s reading needs in and out of school, the impact of family and community engagement, and the use of ICT4E for literacy focused on children with sensory disabilities.
- The [Mobiles for Education Alliance website](#) has an [evidence showcase page](#) with macro-level analysis of various types of ICT4E work. The site also has an [ICT4E Evidence Starter Kit](#) linking to studies that illustrate the breadth and depth of current ICT4E research.
- Tuft University’s 2016 working paper [Technology for Evaluation in Fragile and Conflict Affected States: An introduction for the digital immigrant evaluator](#) offers a five-step decision filter that can help evaluators to ascertain when to use technology for education evaluations in conflict and crisis contexts.
- While drawing specific examples from India, USAID supported the [development of a framework](#) designed to assist multiple stakeholders to more successfully plan and implement educational technology in global education projects, The framework is useful before the adoption of an intervention, or as a *formative assessment* of that intervention as it is being deployed.
- The blog [What’s changed: Ten reflections on ten years of technology use in education](#) (2016) by Michael Trucano of the World Bank provides insights into important ICT4E trends over the last decade.
- Section 6 of this How-To Note, “Integrating ICT4E into the Program Cycle,” contains guidance for monitoring and evaluation of ICT4E projects and activities, including assessment of impact and guidance for establishing strong M&E systems from the earliest stages of project and activity design.

CHALLENGE - INFRASTRUCTURE AND/OR LEARNING OUTCOMES

Well-intentioned donors and policymakers often make ICT4E-investments decisions without clarifying both the rationale for and all the associated total costs of ownership for acquiring, deploying, and supporting technology-supported interventions. They may not understand how it will support existing structures or ultimately improve student learning. These policymakers may feel pressure from vendors promoting and offering ICT4E products with no evidence of results, particularly for improvements in learning outcomes of individual learners. ICT4E efforts often focus on building up ICT infrastructure rather than on truly understanding which technology is most appropriate and cost-effective compared to non-ICT solutions, and how ICT4E investments can lead to results in student learning.

OPPORTUNITIES

- Among other areas, the education “value chain” in a country includes administration, teacher professional development, creation and provision of materials, and family and community engagement. As a first step, USAID education staff and implementing partners can work with host-country counterparts to **identify the educational objectives to be achieved, and then critically examine where and how technology can best be used to strengthen the educational system and support classroom instruction.** For example, the USAID blog [Beyond Tablets: Learning from Track and Trace: Tackling System-Level Challenges with ICT](#) illustrates how ICT can be used to strengthen education service provision in the key area of textbook distribution.
- The [World Bank Education, Technology & Innovation: SABER-ICT Technical Paper Series](#) explores a variety of topics and issues related to ICT4E. The series includes papers on building and sustaining national ICT/education agencies in many countries as well as guidance for policy development and analysis.
- The World Bank developed the [SABER-ICT Framework Paper for Policy Analysis: Documenting national educational technology policies around the world and their evolution over time \(2016\)](#) to help policymakers make better-informed decisions about how best to use ICTs in pursuit of core developmental objectives in the education sector. The framework was constructed by analyzing and synthesizing policy documents from more than 80 countries.

SPECIFIC INTERVENTIONS

- **Textbook Delivery** - Despite decades of investing in books in low-income countries, textbooks and materials can go astray at any stage in the delivery process. Through the All Children Reading Grand Challenge competition, the organizers sourced [Track and Trace software](#) that enables ministry officials, partners, and distributors to track in real-time the ordering and distribution of books and other supplies. Afghanistan, Cambodia, Liberia, Mozambique, and Nigeria are now successfully using this type of system.

Read Liberia has developed an online teaching and learning material (TLM) distribution track and trace system by combining KoBO application and PowerBI server. The project also provided relevant training to TLM distribution teams for better data collection and reporting. The track and trace system was piloted in eight schools in Montserrado County in September 2019. The teams collected data from the distribution centers and held feedback sessions to inform roll out to the other 629 schools. The online system enabled Read Liberia to conduct monitoring and to report on each school visited in real time for schools with Internet, and by close of business day for schools without Internet. As a result of this intervention, the tracking of textbooks was improved by two months.
- **Paying Teacher Salaries** - In 2015, USAID, via the [Mobile Solutions Technical Assistance and Research \(mSTAR\) program](#), launched an initiative to support the Government of Liberia to scale up [mobile money salary payments for teachers](#) nationwide. Teachers with moderate to no mobile money experience successfully received salaries via their mobile devices. The mobile

money payment completely eliminated time away from their classrooms and reduced costs to receive their salaries by 84 percent.

- **EGRA Data Collection** - USAID has funded the use of [Tangerine®](#) software in many countries. Tangerine records students' responses on oral early grade reading and mathematics skills assessments, specifically Early Grade Reading Assessments (EGRA) and Early Grade Mathematics Assessments (EGMA). It also captures interview responses from students, teachers, and principals on home and school context information through the Snapshot of School Management Effectiveness (SSME) surveys.

CHALLENGE - SCALABILITY

With quality education at the center of a nation's progress, countries often grapple with how to scale both successful ICT- and non-ICT-leveraged educational models and activities for children and youth. Adapting a locally successful innovation to a wide variety of settings—while maintaining its effectiveness, affordability, and sustainability—can be very challenging.²⁵ Potential scaling of ICT interventions in classrooms is largely dependent on the quality of teacher training support, quality and language of content, and learner access to associated technologies. A recent article on the topic of scaling educational innovations states that, “Bringing an innovation to scale in education requires a design that is flexible enough to be used in a variety of contexts and robust enough to retain effectiveness in settings that lack its conditions for success. This may involve developing variants that are the equivalent of hybrid plants designed for inhospitable locales. Designing an innovation for sustainability and scale is a multi-stage, iterative process that involves teachers as co-evaluators and co-designers.”²⁶

OPPORTUNITIES

- Management Systems International's [Scaling Up—From Vision to Large - Scale Change: A Management Framework for Practitioners](#) (2012) seeks to improve the relatively poor record of innovative pilot projects, attempting to extend their reach to large populations. The document offers practical advice on a three-step, ten-task process for effective scaling up, as well as a [28-item Scalability Assessment Checklist](#) (pp. 21-22) as a tool that supports the steps and tasks.
- [Millions Learning: Scaling up quality education in developing countries](#) identifies 14 core ingredients, in different combinations depending on the context, that contribute to scaling quality learning. They include essential elements for designing, delivering, financing, and enabling the scaling of quality education. Core ingredient #7 “Technological advances” discusses the importance of context-appropriate technology and other important aspects to bear in mind when analyzing scalability of technology.
- [The All Children Reading Grand Challenge website](#) has a number of [end-of-project reports](#) that discuss the potential for scaling of grant investments using MSI's scalability assessment checklist. An example is [Reading Beyond Sight: Improving Reading Scores of Children with Visual Impairment in Early Primary Education](#) (2017).

²⁵ See Chris Dede and Timothy E. Wirth, “Designing an Educational Innovation to Achieve Scale: Five Critical Concepts,” Harvard University, 2016, https://evollution.com/managing-institution/operations_efficiency/designing-an-educational-innovation-to-achieve-scale-five-critical-concepts/

²⁶ Ibid.

CHALLENGE - SUSTAINABILITY

While one of the key principles in USAID’s Education Policy is to “focus and concentrate investments on measurably and sustainably improving learning and educational outcomes,” there is a littered landscape of well-intentioned ICT projects in both developed and developing countries that were neither sustainable nor well designed.²⁷ For example, the One Laptop Per Child (OLPC) experiment aspired to provide a sub-US\$100 purpose-driven educational tablet. OLPC was deployed in multiple countries and is often cited as an example of a well-intentioned, but ultimately unsustainable ed tech initiative. A rigorous **evaluation** of the OLPC project impact in Peru showed that while the program increased the ratio of computers per student, there was no evidence of effects on enrollment or test scores in math and language. In other cases, national authorities and local educational authorities aggressively pursue educational technology projects without proper design and oversight.²⁸ Such was the case of the citywide roll-out of educational tablets and software by the Los Angeles Unified School District in 2013, which occurred without adequate tendering and software oversight.

OPPORTUNITIES

- *Define Sustainability* - As with any education project, it is important to define sustainability of an ICT4E intervention from the onset and in close collaboration with host country counterparts. In addition to the value of engaging a variety of public and private sector stakeholders, it will be much easier to address this up front than having to make technically and financially challenging course corrections later in a project’s deployment.
- *Moore’s Law* – Named after a former CEO of Intel, [Moore’s Law](#) is the observation that the number of [transistors](#) in a dense [integrated circuit](#) doubles about every two years. In short, this prediction generally underscores the fact that the pace of technological innovation is providing more powerful technology (say in terms of storage capacity and sophistication of applications) while reducing the associated costs. For example, smart phone penetration is increasing in low-resource communities around the world. Nevertheless, whether the costs of acquiring this or other technologies for educational purposes can be justified should still be ascertained through rigorous testing and evaluation.
- *Build upon what’s there* – Because of the associated costs with deploying and supporting new technologies, it’s often wiser to pilot a new educational intervention by building upon existing infrastructure that is already present in a community. For example, there are a multitude of functions that run on low-end and smart phones including the use of [text messaging](#) to support teachers and encourage parent and community level engagement (NBIR, 2017).
- *Build upon what someone else has built* – If there are existing technology deployments to build upon, this also presents an opportunity for early piloting and expansion. Notwithstanding some painful delays and procurement, Kenya rolled out an ambitious [Digital Literacy Programme](#) in September 2016 that has provided more than 1 million laptops for primary learners in that

²⁷ For those interested in a longer read of the pitfalls of investing in technology as a go-to solution for global poverty, see Kentaro Tayoma’s book [Geek Heresy: Rescuing Social Change from the Cult of Technology](#). The author concludes that technology is never the main driver of social progress, but an amplifier of human conditions.

²⁸ Julian P. Cristia, et. al., “Technology and Child Development: Evidence from the One Laptop per Child Program,” (January 2012), <https://publications.iadb.org/en/technology-and-child-development-evidence-one-laptop-child-program>

country. Building upon this initiative, there are several exciting activities in Kenya exploring use of deployed technologies for supporting learners with disabilities including e-Kitabu's [initiative](#) to integrate Sign Language videos in early grade readers by producing digital visual storybooks to support sign language acquisition, vocabulary, and building communication skills as a pathway to literacy for deaf children.

CHALLENGE - INADEQUATE NUMBERS OF TRAINED TEACHERS

Support teacher professional development and change teaching practices: Research shows that existing teacher professional development programs are inadequate in preparing teachers for the 21st century.²⁹ Improving student learning is a challenge when teachers lack training and capacity-development opportunities.

OPPORTUNITIES

ICT can provide teachers with information to improve pedagogy and content mastery, and facilitate their training in literacy and mathematics instruction. Through ICT, teachers also can adopt active and self-directed learning methods to allow students to work with peers or in groups and become more creative and confident in learning.

SPECIFIC INTERVENTIONS

MONITORING AND COACHING

An increasing and promising area of USAID ICT4E investments is supporting administrators and teachers.

Some notable activities in this space included:

Kenya - Through the Tusome early grade reading activity, 30,363 education officials were trained to use a cloud-based, mobile assessment system to capture and monitor classroom-based learning outcomes and teacher performance data. This system helped inform evidence-based, sustainable decision-making in support of sector planning and the National Education Sector Plan. Additionally, project organizers are strengthening in-country capacity by implementing an innovative tablet-based monitoring and evaluation system that currently captures more than 20,000 classroom observations per month.

Senegal – In the Lecture Pour Tous (LPT) activity, the Mission has a partnership with Orange Lab and national mobile operator Sonatel to introduce user-friendly SMS-based applications to improve reading instruction. LPT sends weekly SMS messages to teachers, school directors, and inspectors with reminders from their training, outlining approaches and tools they should use. LPT involved stakeholders in the development of guidelines for the production of audio/video clips that serve as the basis for SMS push message production, and a “Message Bank” that supports the SMS push messages. Teachers, school directors, and inspectors also have access to online services to use the training tools for guided instruction and facilitate communication between educators to increase peer support.

²⁹ D.L. Ball and D.K. Cohen, “Developing practice, developing practitioners: Toward a practice-based theory of professional education.” In L. Darling-Hammond and G. Sykes (eds.), *Teaching as the learning profession* (pp. 3-31), 2000.

South Africa – In the [Early Grade Reading Study II activity](#), the Mission is supporting the Teacher Assessment Resource for Monitoring and Improving Instruction Version 3.0 (TARMII 3.0) to improve the quality of education by providing teachers with an online assessment tool that helps them to more effectively address individual student learning needs in reading. Through this computer application, teachers can access a database of reading activities and test items to generate assessments/exercises tailored for their students.

For more information on the use of and evidence for technology to support teaching coaching and mentoring, please visit:

Rise Programme: [How to improve teaching practice?](#)

USAID Video: [Coaching Teachers in South Africa Produces Results](#)

World Bank Blog: [Can technology enable effective teacher coaching at scale?](#)

Jordan - USAID and the Ministry of Education (MOE) have developed a public-private partnership with Orange Jordan. Orange has provided 362 tablets for MOE supervisors to conduct critical assessments to monitor and evaluate the implementation and impact of activities and additionally allocated 13 million free SMS messages to support the project, which are used to send alerts, tips, and reminders to teachers as well as awareness messages to parents.

CHALLENGE - YOUTH UNEMPLOYMENT AND ICT

With 71 million young people unemployed worldwide in 2017, the lack of economic opportunity is a matter of worldwide concern. High youth unemployment has a negative effect on local economies, and the lack of a young workforce with the needed skills limits businesses' ability to grow and to contribute to higher economic growth. Furthermore, the changing world of work demands transferable, foundational, and technical skills to thrive in today's labor market.³⁰

OPPORTUNITY

Numerous governments are interested in providing 21st century skills to their youth populations and similarly interested in engaging youth in solving national and local development challenges.

One of the priorities in USAID's Education Policy (2018) is for young people to acquire the skills they need to lead productive lives, gain employment, and positively contribute to society. One identified skill in this regard is digital literacy, which, broadly defined, describes a mastery of digital/ICT skills needed for workforce, educational, and civic success.

Digital literacy is defined as the ability to access, manage, understand, integrate, communicate, evaluate, and create information safely and appropriately through digital devices and networked technologies for participation in economic and social life. It includes competencies that are variously referred to as

³⁰ U.S. Agency for International Development, "USAID Education: Youth Workforce Development Fact Sheet, 2019," April 17, 2019, https://www.usaid.gov/sites/default/files/documents/1865/USAID_Education_YouthWorkforce_FactSheet_Apr19.pdf

computer literacy, ICT literacy, information literacy, and media literacy.^{31,32} Digital literacy skills development and access does not exclusively require access to the Internet, but are associated with a broad range of digital technologies (e.g. computers, tablets, mobile phones, digital audio/video, projection).

While there are a multitude of digital literacy initiatives worldwide—and enormous demand for youth with the associated skill sets—many of these efforts are not full integrated in the U.S. Government’s international educational and youth programming nor are they connected to the other day-to-day challenges found in developing countries, such as inadequate numbers of trained teachers, millions of in and out-of-school learners lacking appropriate access and instruction in other foundational skills like literacy and numeracy, soft skills, and those connected to other sector challenges (e.g., health, agriculture, inclusion) found in low-resource, developing country communities.

The Agency’s digital literacy work can build upon—and as appropriate, be integrated into—a number of existing global and local youth-focused and digital literacy initiatives. These include: USAID’s support for the [YouthPower](#), [Youth Lead](#), [Youthmappers](#), and [YALI](#) platforms; UNICEF’s focus on [Digital Literacy for Children](#); BMZ/GIZ, ITU, and World Wide Web Foundation’s gender focus through [eskills4girls](#) and [International Girls in ICT day](#); regional initiatives such as [Africa Girls Can Code](#), and Mastercard Foundation’s Young Africa Work’s [initiative](#) to help 30 million African youth secure jobs by 2030.

A newly proposed USAID intervention, the *Young Digital Leaders for Development* (YDLD) initiative, will focus on combining USG and other international and national efforts toward youth interest and passion in digital literacy instruction and application to strengthen community development and self-reliance efforts by: a) raising awareness of and promoting youth (15-29 years old) access to digital literacy skills training, employment, and entrepreneurship opportunities and, b) identifying, advancing, and supporting digitally enabled young leaders in international, national, and local community development issues.

SPECIFIC INTERVENTIONS

- Summary of Youth and Digital Literacy projects from 2018: See Annex B.
- USAID/Vietnam’s Improving Access, Curriculum, and Teaching in Medical Education and Emerging Diseases (IMPACT-MED) Alliance (2016-2021) is a public-private partnership bringing together a diverse group of university, public and private sector partners. The project introduced technology into classrooms to foster a collaborative learning process. The alliance also introduced a novel tool to assess engagement of students in the STEM classroom, the Classroom Observation Protocol Undergraduate STEM (COPUS)TM. COPUS was utilized by the

³¹ See [UNESCO’s Global Framework of Relevance on Digital Literacy](#) (June 2018). Digital competence is a broader term that breaks out various digital literacy proficiency levels. For example, the European Commission uses the term “digital competence” to involve the confident, critical, and responsible use of, and engagement with, digital technologies for learning, at work, and for participation in society. It includes information and data literacy, communication and collaboration, media literacy, digital content creation (including programming), safety (including digital well-being and competences related to cybersecurity), intellectual property-related questions, problem solving, and critical thinking. The five competence areas can be found in Annex I. Their new [DigComp 2.1: Digital Competence Framework For Citizens](#) provides further elaboration of eight proficiency levels associated these five competence areas.

³² Under SDG 4.4 (to substantially increase the number of youth and adults who have relevant skills, including technical and vocational, for employment, decent jobs, and entrepreneurship). Indicator 4.4.2 is specific to the “percentage of youth/adults who have achieved at least a minimum proficiency in digital literacy skills.”

university faculty to provide peer-to-peer feedback with the goal of increasing classroom interactivity.

- In Mali, the PAJE-Nièta (Projet d'Appui aux Jeunes Entrepreneurs or Support to Youth Entrepreneurs project) project (2010-2015) provided rural, out-of-school youth with improved basic education, work-readiness and technical training, and social and leadership development via Stepping Stone, a mobile application developed by the implementer. A report on the project indicated that 82 percent of youth who completed technical training and received an income-generating activity starter kit were self-employed.

CHALLENGE - ADDRESSING GENDER DISPARITIES WITH ICT4E

Uneven access to the Internet and digital technologies risks exacerbating existing inequalities in learning. Although ICTs have the potential to empower poor and marginalized people, they have in practice led to a much more unequal world over the last decade; the difference between rich and poor has become significantly greater, fuelled in large part by the roll-out of ICTs.³³ This illustrates the “**digital divide,**” i.e., the gulf between those who have ready access to computers and the Internet, and those who do not. The digital divide is evident at national levels: for example, in the poorest countries only 1 out of every 10 people is online, and in many developing countries, less than 10 percent of schools are connected to the Internet.³⁴ The digital divide has other important manifestations. The intersectionality of gender and disability is clearly an important dimension: a significant proportion of the global population experiences systematic oppression and substantial barriers accessing and using technology not only on the basis of gender, but at the intersection between gender and disability.³⁵ There may also be technology learning gaps among different generations, economic groups, ethnicities, and cultural communities. An understanding of how the introduction of ICT4E both affects and is affected by equity and inclusion is crucial for ICT4E intervention designers.

The digital gender gap is evidenced by the following:³⁶

- The proportion of men using the Internet is higher than the proportion of women using the Internet in two-thirds of countries worldwide.
- The proportion of women using the Internet is 12 percent lower than the proportion of men using the Internet worldwide.
- There is a strong link between gender parity in the enrollment ratio in tertiary education and gender parity in Internet use.
- The only region where a higher percentage of women than men are using the Internet is the Americas, where countries also score highly on gender parity in tertiary education.

³³ Unwin et. al., “The Future of Learning and Technology in Deprived Contexts: A Report for Save the Children,” December 2017, <https://unwin.wordpress.com/2018/01/24/the-future-of-learning-and-technology-in-deprived-contexts-a-report-for-save-the-children-international/>

³⁴ Op.cit., International Commission on Financing Global Education Opportunity, 2016

³⁵ The World Health Organization estimates that 15 percent of the world’s population experience long-term disability, and the prevalence is higher among women than men. See Rannveig Alette Skjerve and G. Anthony Giannoumis, April 13, 2018.

³⁶ International Telecommunication Union (ITU), “ICT Facts and Figures 2017,” ITU, accessed November 2019, <https://www.itu.int/en/ITU-D/Statistics/Pages/facts/default.aspx>

- While the gender gap has narrowed in most regions since 2013, it has widened in Africa, where the proportion of women using the Internet is 25 percent lower than the proportion of men.
- Restrictive social norms and structural offline and online inequalities contribute to discrimination and violence against women and girls. Globally, this exacerbates the gender digital divide and threatens human rights.³⁷
- Issues of safety must be taken into account, especially for the most vulnerable. Specific examples of violence facilitated by ICTs include stalking, threats, hate speech, breaches of privacy, blackmail, account hijacking, impersonation, non-consensual sharing of explicit images, human trafficking, and terrorist recruitment.³⁸

Understanding nuances of gender equity is extremely important, a point discussed in the following:

“Discussions around gender, mobiles, and their role in international development are often unproblematically equated with issues of access, and from access they jump to implications of empowerment. We need to question these statistics and how access and empowerment are understood...What constitutes “mobile access” for women? Is it owning a phone or a SIM? Is it being able to use a husband or father’s phone for a few minutes a day?...Can we assume mobile access leads to—or even contributes to—empowerment?...While ICTs have the potential for positive transformation, we still must ask questions on what “empowerment” through technology, especially mobiles, means for women and how it might be achieved.”

Source: S. Bailur, S. Masiero, and J. Tacchi, *Gender, mobile, and development: The theory and practice of empowerment. Introduction. Information Technologies & International Development (Special Section)*, 14, [96–104](#) (2018).

OPPORTUNITIES

- The [Gender and Information Communication Technology Survey Toolkit](#) (2017) contains resources to conduct and use landscape assessments of gender and ICT, providing practical, well-researched tools that can be used to obtain data on women’s access and usage of mobile phones and other connected devices. This data can inform project design or create a baseline to understand the efficacy of an ICT intervention.
- The [USAID Digital Inclusion Team](#) seeks to bridge the digital divide by expanding access to the internet to empower communities, accelerate USAID’s development objectives, and ensure the most marginalized have the skills and resources to be active participants in the digital economy. A [list of USAID projects](#) focused on closing the gender digital divide is available.
- USAID’s [WomenConnect Challenge](#) is supporting solutions to improve women’s participation in everyday life by meaningfully changing the ways women and girls access and use technology.

³⁷ U.S. Department of State Fact Sheet, Office of Global Women’s Issues, “Inclusive Technology: The Gender Digital Divide, Human Rights & Violence Against Women,” December 15, 2017, <https://www.state.gov/inclusive-technology-the-gender-digital-divide-human-rights-violence-against-women/>

³⁸ Ibid.

- The [#eSkills4Girls platform](#) collects and disseminates information and knowledge on the digital inclusion of women. It showcases current initiatives as well as good practices and policy recommendations that are playing an essential part in helping to get more women online and into the tech sector.
- DFID’s [Thematic Review of Educational Technology](#) of the first phase of their portfolio in the [Girls Education Challenge](#) provides a useful summary of several educational technology opportunities and challenges they identified through their grantee investments.
- The [Alliance for Affordable Internet \(A4AI\)](#), a USAID-funded Global Development Alliance, continues to push for policy change that empowers women’s use of ICTs and the Internet, particularly by advocating for policies identified in the Women’s Rights Online project.
- [A Guide for Strengthening Gender Equality and Inclusiveness in Teaching and Learning Materials](#) (2015) provides guidance on how to develop and evaluate print and digitally accessible materials that are free of bias and that promote equality and inclusiveness of all marginalized, disadvantaged, and underrepresented groups. There is also a series of four associated video training modules (see the Resources section of this How-To Note for links).
- [Women’s Pathways to the Digital Sector: Stories of Opportunities and Challenges](#) (2017) explores the role of ICT in realizing women’s rights, gender equality, and women’s economic empowerment in order to identify the challenges and opportunities for women and girls to partake in ICT education and employment. The 22 women portrayed in the study work in different roles in ICT and come from all continents.
- The [World Wide Web Foundation](#) is an independent, international organization that seeks to advance the open web as a public good and a basic right. The [research and publications page](#) of their website contains numerous studies pertaining to gender and ICT4E.
- [International Girls in ICT Day](#) is helping to create a global environment that empowers and encourages girls and young women to consider careers in the growing field of ICT, enabling both girls and technology companies to reap the benefits of greater female participation in the sector. International Girls in ICT Day is celebrated on the fourth Thursday of April. The [Toolkit: Organizing a Girls in ICT Day Event](#) is a useful reference.

CHALLENGE - ADDRESSING DISABILITY INCLUSIVENESS IN ICT4E

The ‘learning crisis’ is especially severe for children and youth with disabilities and will remain so without significant additional effort by the global community. Four out of ten (40%) primary-age students with disabilities do not attend school at all; this percentage rises to at least 55% at the secondary level.³⁹ The few who do attend often do not have full access to information classrooms. Even in contexts where high-level policies are in place to defend the rights of students with disabilities to an education, available curricula, teaching and learning materials, professional development practices, and assessment routines are rarely disability-sensitive or coordinated such that instructors and administrators are truly able to

³⁹ Suguru Mizunoya, Sophie Mitra, and Izumi Yamasaki, “Towards Inclusive Education: The impact of disability on school attendance in developing countries,” UNICEF Office of Research - Innocenti Working Paper, May 2016, <https://www.unicef-irc.org/publications/pdf/IWP3%20-%20Towards%20Inclusive%20Education.pdf>

address the learning needs of their students with disabilities. Despite being approximately 15% of the population, people with disabilities are not noticeably present in higher education classrooms or the general workforce, which strongly suggests that they are not receiving the academic and professional preparation they deserve as children and youth.⁴⁰

Furthermore, students with disabilities are shaped by diverse experiences stemming from their social milieu. Physical accessibility, multimodal accessibility, communication opportunities, knowledge, language, and legal barriers all impact how a student with a disability can, or cannot, benefit from schooling available where he or she lives. Students with disabilities also tend to be few in number and thinly dispersed, and this comparative isolation can have negative implication for learning. For example, more than half of all blind students have no classmates with similar challenges, and this may lead to blind students receiving sub-par educational services in their context.

OPPORTUNITIES

- The Global Reading Network’s new publication on [Using Information Communications Technologies \(ICT\) to Implement Universal Design for Learning \(UDL\): A working paper from the Global Reading Network for Enhancing Skills Acquisition for Students with Disabilities](#) (2019) is a valuable publication to assist Ministries of Education, their donors and partners, and the practitioner community funded by and working with USAID to select, pilot, and—as appropriate—scale up ICT4E. solutions to facilitate the implementation of Universal Design for Learning (UDL), with a particular emphasis on supporting students with disabilities to acquire literacy and numeracy skills. The paper focuses primarily on how technology can support skills acquisition for students with disabilities, while also explaining when, why, and how technologies that assist students with disabilities can, in some applications, have positive impacts for all students’ basic skills development.
- USAID’s [How-To Note: Disability-Inclusive Education](#) (2018) provides guidance specific to the education sector regarding how to integrate disability throughout the USAID Program Cycle. The document offers reference citations and resources for conducting assessments, designing and implementing education programs, and monitoring and evaluating with sensitivity to disability.
- [Universal Design for Learning \(UDL\)](#) is an approach to teaching aimed at meeting the needs of every student in a classroom. The [Universal Design for Learning to Help All Children Read: Promoting Literacy for Learners with Disabilities](#) is a new toolkit for USAID Education Officers and implementing partners that offers guidance on providing literacy instruction in inclusive educational settings for students with disabilities. The toolkit may also be helpful to support Ministries of Education (MOEs), disabled-persons organizations (DPOs), families of children with disabilities, teachers, and administrators in their efforts to improve education for students with disabilities.
- The [CBM Digital Accessibility Toolkit](#) contains a selection of tools and recommendations pertaining to the accessibility of ICT, intended to contribute to the social and economic inclusion of persons with disabilities by ensuring that information is equitably accessible.

⁴⁰ Ibid.

- [Bookshare](#) is the world's largest online library of accessible ebooks for people with print-related disabilities. Members can access a huge collection of customizable ebooks.
- [6 Ways to Engage Every Learner Using Universal Design for Learning \(UDL\)](#) suggests providing a greater variety of options for how learners are taught information (both with and without technology), how they express that they've grasped the material, and how they're continuously engaged and motivated to learn more.
- [Use of Assistive Technology in Inclusive Education: Making room for diverse learning needs](#) (Ahmad, 2015) provides discussion and examples of integration of assistive technology into the regular classroom, which can provide students with multiple means to complete their work, as well as greater independence in performing tasks.
- UNESCO's [Model Policy for Inclusive ICTs in Education for Persons with Disabilities](#) (2014) was developed as a template to assist UNESCO member states in promoting the effective use of inclusive ICTs in education for learners with disabilities. While its main target is the national policy level, it includes consideration of policy at the levels of the individual learner, educational organization, and education system. It is a useful reference tool for those designing and implementing ICT4E interventions.

SPECIFIC INTERVENTIONS

USAID/Ethiopia's [READ TA](#) project piloted initiatives to make the classroom environment more inclusive for students with disabilities. The project screened children for hearing and vision, and adapted the grade 2 teacher's guide in all seven languages to incorporate inclusive practices. For students with vision impairments, it developed a multimedia lesson plan app that integrated audio files into phonemic awareness and story-reading activities. Results from rigorous baseline and end-line assessments indicate significant improvements in teachers' attitudes and self-efficacy in teaching reading to students with vision and hearing disabilities.

The All Children Reading Grand Challenge for Development has supported a variety of technology interventions to support learners who are visually impaired and hard of hearing or deaf. [Information about prior grants and prize award recipients](#) is available.

CHALLENGE - ICT FOR EDUCATION IN CRISIS AND CONFLICT (EiCC) SETTINGS

Ensuring the safety of students, teachers, trainers, and aid workers poses one of the critical challenges to expanded access to education in areas of crisis and conflict. The infrastructural function that technology plays has great potential to provide opportunities for direct instruction of learners and for support for teachers in challenging and dangerous areas by enabling the safe delivery of high-quality learning resources in electronic form, and by supporting communications, distance learning, and other means of providing access to education in remote, crisis, and conflict conditions.

OPPORTUNITIES

- USAID's [Checklist for ICT Interventions to Support Education in Crisis and Conflict Settings](#) (August 2018) guides users in making appropriate decisions about the use of technology to support

educational interventions in a conflict-sensitive manner. It follows the phases of an intervention life cycle: ICT in conflict analysis, implementation and management, monitoring and evaluation, and close-out. It is designed to be user-friendly and guide reflection and action planning.

- [The Inter-Agency Network for Education in Emergencies](#) provides an [ICT inventory for education in emergencies](#) with links to tools and projects for ICT4E in crisis and conflict settings.
- INEE's [Technology and Education in Crises Task Team](#) researches, develops, and advocates for the role of technologies in refugee, conflict, disaster, and other crisis contexts. Studies, evaluations, research, and case studies on emerging evidence particular to EiCC contexts can be found at this site.
- Save the Children's report [EdTech For Learning in Emergencies and Displaced Settings: A rigorous review and narrative synthesis](#) (2018) amasses evidence to develop a nuanced understanding of what is required to implement effective and ethical EdTech programs that lead to children learning, asking the research question: How can the utilization of EdTech (at home or at school) for teaching and learning best facilitate the learning process of children in crisis-affected settings?

SPECIFIC INTERVENTIONS

Approximately 2.25 million Syrian children have lost opportunities for schooling because of the ongoing conflict. Many face difficulties in learning because they have endured long-term stress or because they are taught in a language they do not know. Through the All Children Reading: A Grand Challenge for Development (ACR GCD), USAID funded the [EduApp4Syria](#) competition, which developed two smart phone applications that help Syrian children learn to read and improve their psychosocial well-being. Since the applications were developed as open source software, a variety of other-language versions have also been produced.

CHALLENGE: ICTS AND FAMILY AND COMMUNITY ENGAGEMENT

Without proactive family and community engagement, it will be challenging to remove barriers to quality education, including mobilizing scarce education resources, and increasing accountability for results in learning.

OPPORTUNITY

Access to ICT resources can facilitate community and parent involvement in the delivery of education services to raise awareness about the importance of education and improve governance and accountability through the use of ICT-enabled feedback systems, such as those used to monitor teacher absenteeism and/or track and trace school textbook delivery.

SPECIFIC INTERVENTIONS

The [Makhalidwe Athu \(MA\) project](#) was a pilot to improve the reading skills of young children in Zambia's Eastern Province, using cell phones as a means to provide reading materials. Over a nine-month period, participant households received three SMS on their mobile phones each week containing

a short story for children to read with their families, as well as a question about the story. An [impact evaluation](#) (2018) reported that the MA project had a positive affect on three of the five EGRA subtasks evaluated: non-word reading, oral reading fluency, and reading comprehension.

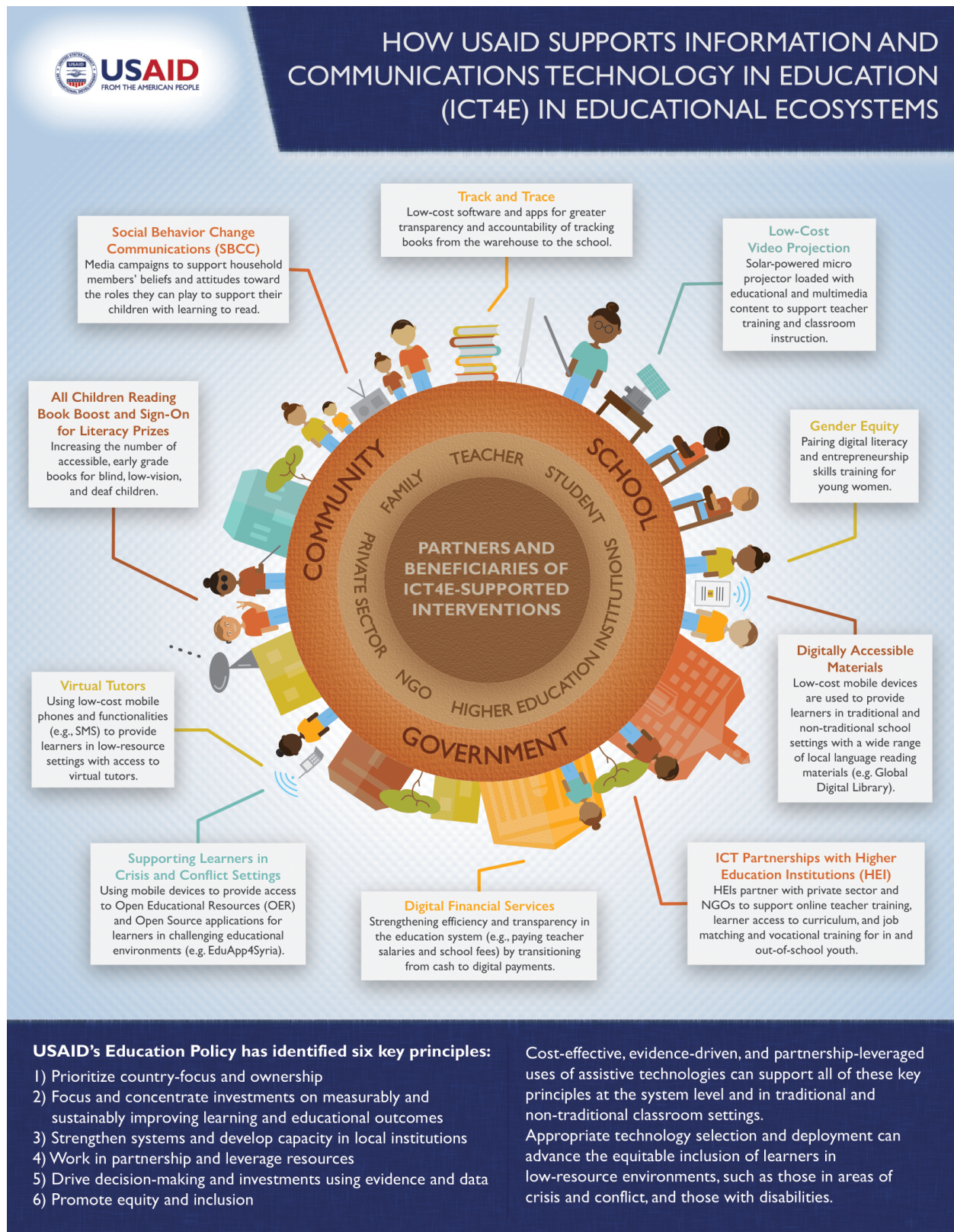
ICT4E can be used to support social and behavior change communication (SBCC) efforts designed to increase family and community support for education. There is recent evidence indicating that these SBCC campaigns are showing results. For example, a [research report conducted in Senegal](#)⁴¹ found that following the USAID-supported SBCC campaign (comprised of a package of radio spots and programs, posters, and community meetings), significant positive changes in household members' beliefs and attitudes toward helping their children learn to read were evident when compared to baseline. Those individuals who reported the highest exposure to the campaign messages and events showed the most positive change.

SPECIFIC INTERVENTIONS

The [METAS Project](#) (2010-2017) in Honduras enabled at-risk youth to gain the job skills, knowledge, attitudes, behaviors, and life perspectives they needed to create positive futures. The project worked through strategic partnerships with public and private institutions of technical secondary education, technical training programs, alternative education systems, government organizations, NGOs, and private-sector partners. METAS successfully implemented a [Geo-Portal Intervention Map and a Business Intelligence Dashboard](#); these technological tools worked as an information management system to improve decision-making in education and training programs.

⁴¹ Schmidt et. al, *Measurement and Research Support to Education Strategy Goal I Social and Behavior Change Communication (SBCC) Research in Senegal: Final Report*, EdData II, October 2016.

FIGURE I. ICT4E Interventions in an Education Ecosystem



8. INTEGRATING ICT4E INTO THE PROGRAM CYCLE

“The race is on between skills and technology, and the outcome will determine whether the dividends from digital technologies are realized and the benefits widely shared. It is important to bridge the digital divides both in access and in capabilities....Providing current and future workers with the cognitive, technical, and socioemotional skills that are augmented by technology—and not replaced by it—is a priority.”

The World Development Report 2016: Digital Dividends, pg. 101

Bridging the digital divide requires careful consideration of both access to technology and content, and the range of skills people need to be able to effectively use technology once they have access. How can those who design and implement education strategies, projects and activities ensure that they adequately address both sides of this important issue, i.e., access and ability to effectively use ICT4E resources?

The matrix below presents techniques and tools for integrating ICT into education programs throughout USAID’s Program Cycle; it is based on recent research and evidence. A number of the strategies presented below originated with earlier ICT4E work by USAID;⁴² these have been updated, adapted, and enriched by including the work of a range of other organizations contributing to the ICT4E knowledge base.

ICT4E	KEY STEPS	RESOURCES
PROGRAM CYCLE STAGE: COUNTRY AND REGIONAL STRATEGIC PLANNING		
<p>National Education Policy dialogue</p> <p>Policies, plans, and central agencies that shape the use of technology in education can help ensure that initial expenditures and activities support government objectives, and that successful projects receive ongoing funding.</p>	<p>Start with an understanding of the education system and national priorities.</p> <p>Use the USAID Self-Reliance Country Roadmap Portal as a source of information for measuring self-reliance and performance of the partner country on 17 multi-sectoral metrics.</p> <p>Review host country national development strategies and education sector plans to understand the education system and nationally established priorities.</p> <p>Determine whether host country education strategies and plans identify sub-national and local issues, including the need to address disparities and inequalities.</p> <p>Identify if there are existing information and communications technology for development (ICT4D) policies that reference education, and/or distinct ICT4E policies.</p>	<p>USAID Education Policy: Program Cycle Integration and Operational Guidance provides guidance on implementing the USAID Education Policy throughout the program cycle.</p> <p>First Principles: Designing Effective Education Programs Using Information and Communication Technology (ICT) – Compendium, by Ed Gaible, Anthony Bloome, Analice Schwartz, Wayan Vota, and Janel Hoppes Poche (2011)</p> <p>Resources for national education policy considerations:</p> <ul style="list-style-type: none"> • https://www.worldbank.org/en/topic/edutech/brief/world-bank-education-technology-innovation-saber-ict-technical-paper-series • http://www.worldbank.org/en/topic/edutech/publication/building-and-sustaining-national-educational-technology-agencies-lessons-models-and-case-studies-from-around-the-world • Trucano, M. 2016. SABER-ICT Framework Paper for Policy Analysis: Documenting national educational technology policies around the world and their evolution over time. World

⁴² See the *First Principles* publications, Gaible et. al, 2011.

ICT4E	KEY STEPS	RESOURCES
		<p>Bank Education, Technology & Innovation: SABER-ICT Technical Paper Series (#01). Washington, DC: The World Bank.</p> <p>See Annex A, Challenge 2 “Infrastructure and/or learning outcomes,” for a discussion of challenges and opportunities in working with host countries to design appropriate ICT4E interventions.</p>
<p>Country Development Cooperation Strategy (CDCS) stage</p>	<p>Use ICTs to achieve education and development goals aligned with the Mission Country Development Cooperation Strategy (CDCS).</p> <p>a) Describe the most important educational challenges and opportunities facing the partner country, based on the best available evidence. Identify the focus areas that the Mission proposes to address.</p> <p>b) Consult with local and international education stakeholders during CDCS development to ensure a common vision for sustaining improvements in educational outcomes. Enrich USAID’s understanding of whether and how ICT4E is used in the host country by discussing it with partners during the consultation process.</p> <p>c) Prioritize country-focus and ownership (USAID Education Policy Key Principle) when contemplating the use of ICT4E.</p> <p>d) If sufficient data and evidence is available, consider ways in which USAID may have comparative advantage in using ICT4E as teams discuss preliminary strategies for achieving CDCS Development Objectives and Intermediate Results. (See ICT4E Key Principle #1 in Section 6 above).</p>	<p>Refer to ADS 201.3.2.6 “Country Development Cooperation Strategy Development Process” for guidance on the CDCS process.</p> <p>Integrating Mobiles into Development Projects (2014) Josh Woodard, Jordan Weinstock, and Nicholas Lesher. This handbook is intended to equip readers with a set of questions to ask when using or considering mobiles. While not specific only to education, it contains very practical tools that can be used starting at the CDCS stage, such as “Guiding Questions for Meetings with Key Partners” (pg. 105).</p> <p>A Framework for Evaluating Appropriateness of Education Technology Use in Global Development Programs, Stacey Allen, Eric Klopfer, and Scot Osterweil (2015)</p> <p>The Worst Practice In ICT Use In Education blog post on the World Bank website provides useful reflections on things to avoid when beginning ICT4E design.</p>
PROGRAM CYCLE STAGE: PROJECT DESIGN & IMPLEMENTATION		
<p>ICT4E Assessment</p> <p>Accurate assessment of issues related to context, such as existing skills and access to devices, is vital prior to developing ICT interventions.</p>	<p>Conduct an ICT4E assessment at the project level to obtain necessary information for project design.</p> <p>Define the development challenge that ICT4E could address under the proposed project, and the context in which it would be implemented. Consider existing evidence and data related to the availability and equitable use of ICT to address this challenge.</p> <p>Use an ICT4E assessment to supplement or refine any existing evidence.</p> <p>Ensure that ICT4E assessment questions and recommendations are specific enough to inform project design.</p> <p>Ensure that issues of equity, safety, empowerment, and inclusion are addressed in the ICT4E assessment.</p>	<p>A Framework for Evaluating Appropriateness of Education Technology Use in Global Development Programs contains specific questions to ask in an ICT4E assessment that are very useful and practical.</p> <p>Technology for Evaluation in Fragile and Conflict Affected States: An introduction for the digital immigrant evaluator. Working Paper contains a useful five step decision filter for considering ICT4E integration in general, not limited to evaluations or to crisis and conflict contexts.</p> <p>See Annex A for a discussion of challenges, opportunities and resources pertaining to safety in crisis and conflict settings.</p> <p>Gender and Information Communication Technology (ICT) Survey Toolkit (2017) provides USAID and implementing partners with practical, well-researched tools to obtain data on women’s access and usage of mobile phones and other connected devices.</p>

ICT4E	KEY STEPS	RESOURCES
<p>Integrating ICT4E into Project Design</p> <p>A project design is approved in a Project Appraisal Document (PAD). See ADS 201.3.3.9.</p> <p>The PAD must contain a Project Monitoring, Evaluation, and Learning Plan that describes how the project team plans to collect, organize, analyze, or apply learning gained from monitoring and evaluation data and other sources.</p>	<p>During PAD development:</p> <p>Identify, analyze, and address ICT4E issues and opportunities in the PAD, based on the available data and evidence. If an ICT4E assessment has been conducted, discuss findings and recommendations in the PAD.</p> <p>If an ICT4E solution(s) is/are deemed appropriate, use the nine Principles for Digital Development as a guide for ICT4E design during PAD development:</p> <ol style="list-style-type: none"> 1. Design with the user. 2. Understand the existing ecosystem. 3. Design for scale. 4. Build for sustainability. 5. Be data driven. 6. Use open standards, open data, open source, and open innovation. 7. Reuse and improve. 8. Address privacy and security. 9. Be collaborative. <p>Drive decision-making and investments using evidence and data (USAID Education Policy Key Principle)—Ensure that project design includes requirements to rigorously measure ICT4E results and ensure accountability, transparency, and value for money.</p> <p>Work in partnership and leverage resources (USAID Education Policy Key Principle). Guide consultations with partners regarding USAID’s role in supporting ICT4E to achieve shared goals and results.</p> <p>Promote equity and inclusion (USAID Education Policy Key Principle). Be explicit in the PAD about how proposed ICT4E interventions will advance equity and inclusion. Integrate analysis of equity, safety, empowerment, and inclusion throughout the PAD, not only in stand-alone paragraphs or sections.</p> <p>Include all short- and longer-term costs in budget planning (ICT4E Key Principle #4, see Section 6 above).</p> <p>Focus investments on measurably and sustainably improving learning and educational outcomes (USAID Education Policy Key Principle). Be explicit in the PAD about plans for scale and sustainability, to ensure that proposed ICT4E interventions are affordable and that the government has adequate capacity to manage them in the long term.</p> <p>Integrate monitoring and evaluation into project planning (ICT4E Key Principle #9). Begin planning and budgeting for monitoring and evaluation of ICT4E during the first phase of project design.</p> <p>Check ADS 201.3.3.7 “Activities with an Information Technology (IT) Component” for requirements regarding projects that will have IT investments.</p>	<p>The mEducation Alliance works to empower evidence-based decision making through an explicit focus on the evaluation of education technology interventions. The mEducation Alliance Landscape Reviews provide evidence and evaluations useful for project design: http://www.meducationalliance.org</p> <p>See Annex A for a discussion of both challenges and opportunities on the topics of ICT4E scalability and sustainability.</p> <p>See the USAID Acquisition and Assistance Strategy (December 2018) for guidance on USAID procurement priorities and approaches; this planning can begin at the PAD stages. The A&A Strategy also outlines how USAID plans to foster self-reliance in its approaches to partnering.</p> <p>2018 USAID Education Policy</p> <p>The USAID Education Policy Program Cycle Implementation and Operational Guidance provides guidance on implementing the USAID Education Policy throughout the program cycle.</p> <p>USAID has an overarching Local Systems Framework and uses the 5Rs Framework as a simple and practical tool to promote good systems practice.</p> <p>See the following blog for an example: Good Practices for Engaging Host Countries for Sustainable Education Programs - Malawi’s Experience</p> <p>USAID’s Global Development Alliance (GDA) program provides opportunities for collaboration with private-sector partners.</p> <p>USAID’s Gender and ICT Training Course focuses on integrating gender and ICT programming for USAID staff and implementing partners.</p> <p>See Annex A for a discussion of challenges, opportunities, and additional resources to address gender and disability inclusion in ICT4E.</p> <p>For guidance on design and implementation of gender-inclusive digital job interventions for youth, see Solutions for Youth Employment (S4YE). (2018). Digital Jobs for Youth: Young Women in the Digital Economy. Washington, DC: World Bank.</p> <p>See Annex B for examples of current and recent USAID projects and activities around the world that incorporate ICT4E.</p>

ICT4E	KEY STEPS	RESOURCES
PROGRAM CYCLE STAGE: ACTIVITY DESIGN & IMPLEMENTATION		
ICT4E Assessment	<p>Consider conducting an ICT4E assessment at the activity level:</p> <p>If there is a project-level assessment and it is too broad or framed at a level too high to be useful for designing the individual subordinate activities; or</p> <p>If learning occurs during implementation that leads to a substantial revision of a project or activity.</p> <p>USAID can require an ICT4E assessment as a deliverable in the activity solicitation if more in-depth information is needed at the beginning of an activity.</p>	<p>Examples:</p> <p>ICT Baseline Assessment Report (Ethiopia)</p> <p>Situation Analysis for strengthening the application of ICT in government primary schools (GPS) (Bangladesh)</p>
Integrating ICT4E into Activity Design	<p>During activity design:</p> <p>If an ICT4E assessment has been conducted, use findings and recommendations to inform activity design.</p> <p>Explore technology alternatives to find appropriate solutions (ICT4E Key Principle #5). Think creatively about the wide variety of available tools and approaches and ensure that they are appropriate to the local context.</p> <p>Explore and coordinate involvement of many different stakeholders (ICT4E Key Principle #7) in choosing which interventions are most suitable for USAID investment.</p> <p>Use ICT to enhance student knowledge and skills (ICT4E Key Principle #2). These skills include literacy, numeracy, information literacy, and independent learning skills. Focus on learning outcomes.</p> <p>Focus on teacher development, training, and ongoing support (ICT4E Key Principle #6). Design professional development to meet teachers' needs and program objectives. Use ICT to provide follow-up to and support for professional development.</p> <p>Be explicit about how the activity's proposed ICT4E interventions will advance equity and inclusion. Integrate analysis of equity and inclusion and approaches for addressing them throughout activity design, not only in stand-alone paragraphs or sections.</p> <p>Use ICT to support data-driven decision making (ICT4E Key Principle #3), creating sources of regular and reliable data for planning and policy. Ensure that data can be easily accessed and shared.</p> <p>Integrate monitoring and evaluation into activity planning. Define and budget for specific monitoring and evaluation needs at the activity level.</p>	<p>See the USAID Acquisition and Assistance Strategy (December 2018) for guidance on USAID procurement priorities and approaches. The A&A Strategy also outlines how USAID plans to foster self-reliance in its approaches to partnering.</p> <p>The International Society for Technology in Education (ISTE) has resources that can be useful at this stage. For example, the ISTE Essential Conditions are the 14 critical elements necessary to effectively leverage technology for learning. They offer educators and school leaders a research-backed framework to guide implementation of the ISTE Standards, tech planning, and system-wide change.</p> <p>See Annex B for examples of current and recent USAID projects and activities around the world that incorporate ICT4E.</p>
Solicitation	<p>Address ICT4E in the Program Description or Statement of Work.</p> <p>Background section:</p> <p>Incorporate findings from an ICT4E assessment and/or any other relevant information important to the ICT4E context of the activity.</p> <p>Monitoring and evaluation:</p> <p>Require implementers to track and routinely report</p>	<p>See Annex C for examples from recent USAID solicitations around the world showing how to integrate ICT4E in Statements of Work and Program Descriptions.</p> <p>USAID staff can find sample annotated solicitations for education programs on ProgramNet.</p>

ICT4E	KEY STEPS	RESOURCES
	<p>on ICT4E indicators.</p> <p>Special instructions:</p> <p>Reiterate and reinforce any ICT4E requirements presented in the solicitation and emphasize the most critical elements.</p> <p>Require that respondents buttress their proposed ICT solutions with inclusion of evidence-driven documentation of impact/success elsewhere.</p> <p>Require that respondents specify plans for sustainability and scale, and how these will evolve over the life of the activity.</p> <p>Staff qualifications:</p> <p>If ICT4E is a significant part of the activity, include qualifications for knowledge of ICT4E issues as appropriate.</p> <p>Technical evaluation criteria:</p> <p>In the Technical Approach, include the extent to which the proposal addresses ICT integration linked to achievement of concrete results, monitoring, and evaluation.</p> <p>Cost information:</p> <p>Include level of effort and resources needed to carry out the interventions for ICT4E. Refer to USAID's guidance on cost reporting.</p> <p>Deliverables:</p> <p>Include a requirement for routine reporting on the relevant ICT4E indicators. Require success stories or communication briefs to document ICT4E accomplishments.</p>	
<p>The following two solicitation mechanisms encourage private sector partners to team with USAID for activity implementation. Both are open for applications for one year at a time.</p> <p>1. GDAs can be used to: 1) leverage non-governmental and private sector resources around shared development objectives; 2) convene and steer a broad array of partners around crucial education challenges; 3) help education businesses reach new markets and develop new products; or 4) facilitate dialogue with many partners around policy reform and the enabling environment for business.</p> <p>The GDA Annual Program Statement (APS) is an invitation to prospective partners to work side-by-side with USAID and other interested organizations to build partnerships that foster and leverage market-based approaches to solve critical business and development challenges.</p> <p>A listing of GDA partnerships worldwide supporting education is available.</p> <p>2. Development Innovation Ventures (DIVs)</p> <p>DIVs can be used 1) to support organizations and entrepreneurs piloting innovations in products and technologies (eg: edtech, assistive devices for disability inclusive education); or 2) to support organizations and entrepreneurs piloting innovative education service provision (eg: pedagogical innovations, wraparound education services such as language or technology instruction).</p> <p>Both non-profit and for-profit organizations are eligible to apply for DIVs.</p> <p>Organizations apply through the DIV Annual Program Statement (APS), which is typically open for one year at a time.</p> <p>A listing of DIV partnerships worldwide is available.</p>		
Award	<p>Work with the Contracts/Agreement Officer to ensure that any ICT4E requirements make it from solicitation to signed award.</p> <p>Plan for an award-signing kick-off meeting to review and ensure compliance and accountability for ICT4E requirements. Discuss all ICT-related aspects of</p>	<p>Training Series on How to Work with USAID; for implementing partners</p> <p>E-module slides: Post-Award Orientation Conferences</p>

ICT4E	KEY STEPS	RESOURCES
	implementation and monitoring.	
PROGRAM CYCLE STAGE: MONITORING AND EVALUATION		
<p>Monitoring & Evaluation</p> <p>The purpose of monitoring, evaluation, and learning practices is to apply knowledge gained from evidence and analysis to improve development outcomes and ensure accountability for the resources used to achieve them.</p>	<p>Refer to the Resources column at right for general USAID guidance and sources of information for monitoring, evaluation, and learning.</p> <p>Test effectiveness and cost-effectiveness of ICT solutions early in the life of an activity; ICT solutions are highly context-sensitive and must be tested in the specific context where they will be implemented.</p>	<p>Guidance for Monitoring, Evaluation, & Learning (MEL) Plans: ADS 201.3.4.10, ADS 205.3.8.1, and ADS 201.3.5</p> <p>USAID Monitoring Toolkit: Resources on monitoring in the Program Cycle.</p> <p>How-To Note: Project Monitoring, Evaluation, & Learning (MEL) Plan (March 2017): Provides guidance on the purposes of evaluation, the types of evaluations that are required and recommended, and the approach for conducting, disseminating, and using evaluations.</p> <p>Activity Monitoring, Evaluation, & Learning Plan Guidance Document (November 2017) provides detailed instructions and outlines practical steps for implementation partners who will need to complete their Activity MEL Plan in alignment with USAID standards stated in the How-To Note Supplements to the ADS.</p> <p>USAID Evaluation Policy (2016): Guidance on the purposes of evaluation, the types of evaluations that are required and recommended, and the approach for conducting, disseminating, and using evaluations.</p> <p>USAID Evaluation Toolkit: USAID guidance, tools, and templates for initiating, planning, managing, and learning from evaluations.</p> <p>USAID Cost Reporting Guidance for Education Programs provides guidance for USAID Agreement and Contracting Officer's Representatives and their implementing partners on how to capture and report project expenditures as well as contributions of government and non-government partners in USAID-funded education programs.</p>
Indicators	<p>The foreign assistance framework does not currently include standard indicators designed to measure outputs and outcomes related to the development and use of ICT in education. Custom indicators are necessary. See “Working with indicators for ICT4E” below for more information and examples of custom indicators.</p> <p>Develop custom indicators as needed to capture quantitative and qualitative results.</p> <p>Disaggregate all people-level standard and custom indicators by sex, age bands, and disability status, where applicable.</p> <p>Ensure that all data collected is routinely reviewed and used to inform management decisions.</p>	<p>Education-Related Standard Foreign Assistance Indicators</p>
<p>Working with indicators for ICT4E:</p> <p>Missions can use custom indicators to capture relevant ICT4E data. For example, the former standard indicator “Number of</p>		

ICT4E	KEY STEPS	RESOURCES
<p>schools using Information and Communication Technology due to USG support,” archived in 2016, allows projects to track the uptake of ICT provided to schools with USG assistance throughout the life of the activity, and establishes a foundation for monitoring by the government after the end of the activity.</p> <p>Custom outcome indicators can be used to measure the improvements in digital literacy among youth beneficiaries as well as educators themselves. Such indicators would need to be context-specific and based on the USAID-funded intervention. For example, an activity promoting the use of Massive Open Online Courses (MOOCs) in the higher education system may want to measure the number/percent of educators who regularly access relevant content through MOOCs to improve their instructional practice.</p> <p>Since instructional technology is widely used to improve learning outcomes throughout the education system, the ultimate learning outcomes achieved using ICT can be measured using Standard Foreign Assistance Indicators related to learning, such as ES.1-1 or ES.1-2 (refer to the Education and Social Services Indicator Reference Sheet at the link provided).</p> <p>Output indicators can be very helpful for documenting activity accomplishments, such as developing or supporting uses of ICTs to support instruction, and with institutional transformation as a result of USAID support. For example, custom indicator “Number/percent of vocational schools that offer online courses as a result of USG assistance” is useful for documenting and reporting changes in institutional capacity as a result of USAID work. If the intent of the activity is to expose beneficiaries to rich offerings of online courses, the custom indicator can be “Number/percent of beneficiaries taking online courses as part of their graduation requirements.” These kinds of indicators tell us about changes with exposure and institutional capacity to support teaching and learning using ICT, but not the result of this exposure, which should be measured using learning outcomes indicators (standard or custom).</p>		
<p>Reports:</p> <ul style="list-style-type: none"> Operational Plan Performance Plan Report (PPR) Portfolio Review (PR) Quarterly, Annual, and Final Reports 	<p>For Operational Plans, include specific plans related to funding allocations and activities under the appropriate narrative section. The Science, Technology, and Innovation Key Issues narrative, while not specific to education, can be used to report on ICT4E interventions.</p> <p>For PPRs, PRs and other reports, report on ICT4E results and their impact on or contribution to achievement of development objectives and intermediate results. Provide sex-disaggregated data and progress on gender-sensitive indicators.</p> <p>When possible, include success stories and other story series around key themes that track progress and developments during the course of the project and create a strong narrative about ICT4E results.</p>	
<p>PROGRAM CYCLE STAGE: LEARNING AND ADAPTING</p>		
	<p>Identify learning questions related to ICT4E, or potential gaps in the theory of change or technical knowledge base.</p> <p>Ensure that evidence related to ICT4E interventions is submitted to the USAID Development Experience Clearinghouse (DEC).</p>	<p>USAID Learning Lab USAID CLA Toolkit provides resources on developing a Learning Agenda and M&E for Learning.</p> <p>See Annex D for sample ICT4E learning agenda questions.</p> <p>ADS 201.3.5 Monitoring, Evaluation, and Learning</p>

9. RESOURCES

TABLE I. Evidence, Research, and Evaluations

Title	Use/Summary of Document
mEducation Alliance - Evidence Showcase	In response to the call for more rigorous evidence in the ICT4E sector, this page on the mEducation Alliance website compiles and showcases rigorous, innovative, and relevant evaluations for practitioners, policymakers, and researchers. The studies were sent to the mEducation Alliance directly, or were found in the course of members' ICT4E work.
All Children Reading Grand Challenge - research page	This page provides resources for ICT4E research initiatives in three areas: technology-based early grade reading projects, digital gaming, and education in crisis and conflict. The research tab also links to project evaluations, baseline reports, edtech/literacy reports, and landscape reviews.
Mobiles for Education Evaluation Abstracts (2015)	Evaluations included in this volume include both performance and impact evaluations that report on a number of outcomes relevant to ICT4E, ranging from attitudes toward the technology to measurements of learning gains.
Landscape Review: Leveraging Technology for Education of Refugees and Internally Displaced Persons	This review compiles research from more than 15 countries that are affected by refugees and internally displaced persons. The research is meant to help policymakers, practitioners, and donors to better understand the evidence related to using ICT4E solutions to meet the complex demands of these populations. The review is broken into three self-paced online modules filled with practical examples.
Synthesis of Findings and Lessons Learned from USAID-Funded Evaluations: Education Sector 2013–2016 (2018)	This report synthesizes findings from USAID-funded evaluations for education from 2013-2016, and evaluates their quality. Recommendations for ICT4E programming are found on pg. 108. In addition, nine products associated with the study can be viewed by clicking on icons in an associated two-page summary of the report .
The Role of Digital Financial Services in Accelerating USAID Education Goals (2018)	Intended to help USAID practitioners understand how the targeted use of DFS can support USAID education programming. DFS can promote greater time and cost efficiencies and transparency for education service delivery within, and outside of, the classroom.
mAccess Diagnostic Tool	The mAccess Diagnostic Tool for USAID staff and partners is comprised of an online platform providing key statistics on national mobile ecosystems as well as comparisons between countries and regions. There is also a User Manual (PDF), a complement to the online platform, which is designed to provide users with general instructions on how to navigate the website, an overview of website functionalities, and tips and best practices for interpreting the data presented.
The Role of Science, Technology, Innovation, and Partnerships in the Future of USAID (2017)	This report evaluates the role of science, technology, innovation, and partnerships as implemented by USAID to actively seek out new ideas and approaches that facilitate and accelerate sustainable global development.
<i>Lessons from the Field: A Report About Integrating Science, Technology, Innovation, and Partnership (STIP)</i>	The U.S. Global Development Lab commissioned this study to better understand how Mission staff understood and took steps to integrate science, technology, innovation, and/or partnerships (STIP) into their work.
Education Technology: An Evidence-Based Review (2017)	This study synthesizes and discusses experimental evidence on the effectiveness of technology-based approaches in education and outlines areas for future inquiry. The paper examines randomized control trials across the following categories of education technology: 1) access to technology, 2) computer-assisted learning, 3) technology-enabled behavioral interventions in education, and 4) online learning.

Title	Use/Summary of Document
<u>Education in Conflict and Crisis: How Can Technology Make a Difference? A Landscape Review</u> (2016)	This landscape review identifies major trends, patterns, and lessons learned about the use of mobile technologies in crisis and conflict settings, and also defines gaps in the existing knowledge base.
<u>Bridging the Gender Gap: Mobile access and usage in low and middle-income countries</u> (2015)	The report (available in English, French, and Spanish) examines how many women in low- and middle-income countries own mobile phones, how intensively they use them, and the barriers to mobile phone adoption and use compared to men.
<u>Digital Jobs for Youth: Young Women in the Digital Economy</u> (2018)	This flagship report provides operational recommendations for the design and implementation of gender-inclusive digital jobs interventions for youth.
<u>Technology for employability in Latin America: Research with at-risk youth and people with disabilities</u> (2009)	This study examines programs that provide basic computer training for people with disabilities and at-risk youth. Based on primary research in five countries (Brazil, Ecuador, Guatemala, Mexico, and Venezuela), it discusses the landscape of issues around technology and employability and investigates how ICT training affects the employability concerns of two populations with diverse needs and histories of social and economic exclusion.
<u>Engaging Families and Communities to Support Student Reading Skills Development</u>	This summary report examines the approaches used by the ACR GCD Round 2 projects to engage families and communities and the reading gains that children achieved. It then offers a case study highlighting promising practices. Finally, this report outlines lessons learned from implementation and explores whether the projects mitigated those factors known to limit family engagement.
<u>Women's Rights Online: Translating Access into Empowerment</u> (2015)	This report explores the real extent of the digital divide in nine cities across nine developing countries, in order to gain a better understanding of the empowering potential of ICTs as a weapon against poverty and gender inequality, and the barriers that must be overcome to unlock it.
<u>Education Technology Evidence Map</u> (2016)	This evidence mapping was conducted to identify the empirical evidence on the use of technology for education in low-resource environments. The findings are presented in the form of an evidence gap map and accompanying user guide.

TABLE 2. Resource Repositories and Tools

Title	Use/Summary of Document
<u>Global Digital Library</u>	The Global Digital Library (GDL) provides free online access to high-quality books for print and digital use as well as adaptation. The GDL provides books in 15 languages and will offer titles in more than 100 languages by 2020.
<u>Tech for Good: The Role of ICT in Achieving the SDGs</u>	This 10-week online course was developed by UNESCO and Cetic.br/NIC.br, the Brazilian Network Information Center's Regional Center for Studies on the Development of the Information Society. It brings together ICT and sustainable development thought leaders to show how digital technologies are empowering people around the world by providing access to education, healthcare, banking, and government services; and how "big data" is being used to inform smarter, evidence-based policies to improve people's lives in fundamental ways.
<u>Checklist for Information and Communications Technologies (ICT) Interventions to Support Education in Crisis and Conflict Settings</u> (2018)	This ICT in EiCC checklist focuses on the intersection of conflict sensitivity principles and ICT design approaches to help ensure that an ICT intervention designed to support education activities in a country or community is conflict sensitive.

Title	Use/Summary of Document
Gender and Information Communication Technology (ICT) Survey Toolkit (2017)	This toolkit helps to fill the gap in available, standardized resources for obtaining an overall landscape assessment of gender and ICT for USAID programming. It provides USAID and implementing partners with practical, well-researched tools they can use to obtain data on women's access and usage of mobile phones and other connected devices.
A Guide for Strengthening Gender Equality and Inclusiveness In Teaching and Learning Materials	This guide is accompanied by four video training lessons: Theme 1: Equal Frequency of Representation Theme 2: Illustrations Theme 3: Gender Equitable and Inclusive Language Theme 4: Gender Equitable and Transformational Roles
#eSkills4Girls initiative	The G20 #eSkills4Girls initiative tackles the existing gender digital divide in low income and developing countries. The goal is to globally increase the access of women and girls in the digital world and to boost relevant education and employment opportunities. This platform was initiated by the G20 members together with UNESCO, UN Women, ITU, and OECD to collect and disseminate information and knowledge as well as policy recommendations, good practices, and flagship projects on gender digital equality.
Integrating Mobiles into Development Projects (2014)	This handbook was prepared for USAID staff and other development practitioners interested in using mobile technology effectively in their projects. The handbook contains two sections: an in-depth guide to everything you might need to know about mobiles and practical information for integrating mobiles into a project.
International Society for Technology in Education (ISTE)	ISTE offers evidence-based professional learning, virtual coaching, and year-round academies to support educators in learning and applying effective strategies for the transformational use of technology. The website contains practical guidance, evidence-based professional learning, virtual networks, thought-provoking events and the ISTE Standards .
Scaling Up Framework	MSI developed a Scaling Up Framework , which draws upon lessons learned in the scaling up process. In 2012, MSI also published "Scaling Up – From Vision to Large-Scale Change - A Management Framework for Practitioners" along with a companion "Scaling Up: Tools and Techniques for Practitioners."
UNESCO ICT in Education website	UNESCO supports the efforts of its member states to design and implement effective, evidence-based ICT in education policies and master plans. The organization works to ensure activities on the ground respond to the unique needs of countries and local communities alike and are guided by collaborative and consensus-driven approaches. Special care is taken to support the most disadvantaged populations and guarantee the equity, quality, and relevance of education for all.
UNESCO's Mobile Learning Week	Mobile Learning Week is the United Nations' flagship ICT4E conference. Held annually at UNESCO Headquarters in Paris, the event convenes experts from around the world to share how affordable and powerful mobile technology can accelerate learning for all, particularly people living in disadvantaged communities. Each year the event has a specific theme to focus discussions.
The World Bank EduTech Blog	This blog explores related to ICT use to benefit education in developing countries.
Michael Trucano's posts to the World Bank EduTech blog	Michael Trucano is the principal contributor to the World Bank's widely read EduTech blog. He is the World Bank's Senior Education & Technology Policy Specialist and Global Lead for Innovation in Education, working on issues at the intersection of technology use and education in middle- and low-income countries and emerging markets around the world. He has posted many valuable articles, e.g."
Better than Cash Alliance	The Better Than Cash Alliance is a partnership of governments, companies, and international organizations that accelerates the transition from cash to digital payments in order to reduce poverty and drive inclusive growth. Based at the UN, the Alliance has 60 members, and is funded by the Bill & Melinda Gates Foundation, Citi Foundation, MasterCard, Omidyar Network, USAID, and Visa Inc. The United Nations Capital Development Fund serves as the secretariat. The website has a series of toolkits to help different stakeholders in their shift toward electronic payments.

Title	Use/Summary of Document
STIP Integration Handbook: A Guide for Mission-Level Staff (for USAID staff only)	This handbook is an illustrative guide for field-based USAID staff to use resources in the areas of STIP to advance their Mission-level priorities.
Development Innovation Ventures	Development Innovation Ventures (DIV) is an open innovation fund at USAID that sources, supports, and scales breakthrough solutions to global development challenges. Through a year-round grant competition for innovative ideas in any sector and nearly any country, DIV invests funding and hands-on support in solutions with the potential to deliver more impact, for lower cost, at sustainable scale.
eLearning Africa	eLearning Africa hosts annual conferences in English and French about technology-supported learning and skills development, with over 85 percent of participants from the African continent. Conferences include core dialogues, debates, discovery demos, knowledge exchange sessions, knowledge factories, networking meetings, panel talks, plenary sessions, poster presentations on specific topics, and informal networking opportunities in which practitioners share their experiences, ideas, new information, and perspectives.

ANNEX A. EXAMPLES OF USAID ICT4E INTERVENTIONS

	ICT Tool	Location	Example(s) of Application
Objective: Increase Access to Education			
Access to basic education	Radio	Worldwide	Interactive Radio Instruction (IRI) has been implemented in more than 50 countries over the past 30 years, often with USAID support. It appears to be associated with generally higher levels of student achievement, but is dependent on country-specific circumstances, quality of project implementation, and the extent to which students actually listen to programs. ⁴³
Objective: Improve Learning			
Pre-school and early grade reading support	Video, radio, interactive media	Bangladesh, Egypt, Indonesia, Jordan, Kosovo, Nigeria, South Africa, Tanzania	Sesame Workshop - Early grade educational television programs tailored to the unique needs of children, their country, and culture, created with local educators, advisors, and puppeteers.
	Video	Ethiopia	Whiz Kids Workshop Ethiopia - Production of television episodes using the ‘Tsehai Loves Learning’ puppet show as a platform to convey different messages about health related topics suited for children and parents. Children’s books have also been produced to complement the effort.
	Video	Tanzania	Ubongo Kids Clubs -Tanzania - Community-based video learning clubs to improve the educational outcomes of children in non-electrified communities. The pilot model was evaluated to measure academic performance, attendance trends, and qualitative information across treatment arms, as well as a control group who did not watch any of the programs.
	Tablets	Africa region	KitKit School - A tablet-based application with a comprehensive curriculum that spans early childhood through early elementary. It is designed to provide children with the foundations and practice needed to build fundamental skills in literacy and numeracy regardless of access to school or resources.
	Instructional platform	South Africa	HEL partnership - Bridges to the Future - Penn State University and Molteno Institute for Language and Literacy of South Africa developed an ICT-based, phonics-enriched instructional platform that provides multilingual instruction to South African children in primary schools.
	e-readers	Worldwide (in 47 countries)	Worldreader - Worldreader studied the efficacy of e-readers in an early grade reading program in Ghana (iRead 2) from 2012-2014 through an All Children Reading grant. Students received a wide range of Ghanaian and English language reading materials through e-reader technology. The group of students that received e-readers greatly outperformed the baseline groups on EGRA basic reading comprehension tests.

⁴³ Jennifer Ho, Hetal Thukral, and Mike Laffin, “Tuned in to Student Success Assessing the Impact of Interactive Radio Instruction for the Hardest-to-Reach,” 2009, <http://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.507.3541&rep=rep1&type=pdf>.

	ICT Tool	Location	Example(s) of Application
Access to learning materials	Websites	Worldwide	Global Digital Library collects existing high quality open educational reading resources, and makes them available on web, mobile, and for print. By the end of 2020, the library will offer resources in at least 100 languages. The platform will also facilitate translation and localization of these resources to more than 300 languages.
	Software	Worldwide	Bloom Software - Bloom was designed for use by anyone with basic computer skills. Teachers and other members of the community can use the software to publish original materials. The software also provides a library of shell books (book templates with room for text translated into the local language).
	Tablets	Cambodia	E-books 4 Khmer - Students in semi-urban and rural Cambodia read leveled e-books in Khmer on the SmartBooks application and answered corresponding quizzes and questions. Teachers received training on differentiated instruction techniques and were given corresponding resources to help them implement differentiated instruction.
	Computers, Tablets, ebooks	Jordan	Oyasas ("Stories"): An Arabic Leveled Digital Library for Every Classroom - Students in Amman, Jordan, read storybooks and leveled e-books in Arabic on tablets. Teachers hosted bi-weekly literacy clubs for students.
	ebooks	Kenya	eKitabu - creating a library of open source, accessible digital titles, adapting its open standards-based toolkit for local content developers in Kenya.
Family and community engagement	Radio Spots, Radio Programs, Posters, and Community Meetings	Senegal	Social and Behavior Change Communication (SBCC) campaign - A pilot study in two regions in Senegal tested whether an SBCC campaign could change household members' beliefs and attitudes toward the roles they can play to support their children learning to read. The study also tested whether such a campaign could induce family members to engage in behaviors to support their children's reading, including specific activities designed to help students practice early literacy skills.
	Mobile app	Guatemala	EscuelaApp - provides real-time access to school-level information on more than 30,000 schools. The portal is used by communities and civil society to compare resources available in different communities, monitor learning outcomes, and access reliable information to advocate for education quality and ensure accountability and transparency within the education system.
	Mobile phone SMS	India	Read to Kids India seeks to promote the school readiness of young children by empowering caregivers and teachers to read to and with them via their mobile phones.
	Various	Various	Engaging Families and Communities to Support Student Reading Skills Development describes activities in various countries to engage families.
	Radio, Television, Mobile Phone Technologies (SMS)	Yemen	The Yemen Early Grade Reading Approach project introduced a new, phonics-based reading program to schools across the country. The new approach worked so well that it is now being used nationally and has become part of the official first grade curriculum. YEGRA included a national reading campaign designed to promote a culture of reading with radio and TV messages, a mini-documentary, print materials and SMS messages.
	Radio, posters, community meetings, and theater	Malawi	A USAID-funded Early Grade Reading Activity (2013-2016) developed an SBCC campaign to validate/replicate the results of the SBCC pilot in Senegal, using a multichannel approach to motivate parents to be more involved in their child's school work and reading at home. The SBCC materials included

	ICT Tool	Location	Example(s) of Application
			delivering messages to parents through radio spots, a radio program, posters, community meetings, radio listening groups, and community theater performances. The household survey conducted to measure the SBCC campaign impact showed acceptable recall of the campaign messages and demonstrated changes in attitudes, norms, self-efficacy, and behaviors.
Support for classroom teachers	Tablets, Mobile Technology	Kenya	Tablets to support teacher coaching - Training of education officials to use tablets containing support materials for classroom observation and feedback to teachers to improve delivery of lessons. Mobile technology is used to register training sessions and mobile money transfers to reimburse teachers' expenses while in training. The project is showing improvements in students' reading of between 7 and 20 words per minute.
	Interactive radio, Videos	Mali	Our Children Learn to Read - Students in the Sikasso region of Mali were taught in Bamanankan by teachers who received training—in person and through interactive radio instruction—to use the balanced literacy approach to teach reading. Half of the teachers also watched training videos modeling teaching strategies and techniques.
	Tablets, Apps, videos	Ethiopia	READ TA - Technology innovations included an app called Papaya for pre-service teacher educators. Papaya plays and records letter sounds in the seven mother languages and has been distributed on tablet devices to mother language lecturers at all of Ethiopia's Colleges of Teacher Education. To complement Papaya, READ TA produced more than 200 model videos highlighting key instructional techniques to help emerging teachers build models of quality reading instruction in the classroom.
	Video, internet, solar panels	Rwanda	Literacy, Language, and Learning Project supported the production of video modules to support in-service teacher training, and provided teacher mentors with 1,000 netbooks. Through the associated Mentorship Community of Practice project, USAID provided wireless Internet modems and airtime to facilitate access to an online portal of learning and teaching resources and a platform for interaction and communication. Schools that lacked electricity received solar panels to enable ICT usage for learning in the classroom and foster future ICT investment by communities.
	Video	Various (22 countries)	One Media Player Per Trainer - OMPT visits NGOs in-country to deliver a four-day, hands-on training workshop as well as the necessary equipment for making, editing, and sharing video. The workshop is customized to fit the region-specific needs of the NGO and prepares the staff in the skills necessary for producing and disseminating culturally sensitive, locally relevant material.
	Video, e-libraries	Indonesia	Prioritizing Reform, Innovation, and Opportunities for Reaching Indonesia's Teacher, Administrators, and Students (PRIORITAS) - trained teachers using model videos on effective teaching and learning methods.
	Solar powered mobile device (projector loaded with educational and multimedia content), Mobile Phone Technologies	Sub-Saharan Africa and other developing regions	The CyberSmart Digital Learning Platform is a social enterprise that reaches classrooms without electricity in sub-Saharan Africa and other developing regions. See CyberSmart Africa for examples.

	ICT Tool	Location	Example(s) of Application
	(SMS, video)		
Objective: Improve Collection of Education System Data			
Student assessment data	Mobile computers, netbooks, tablets, smart phones	Worldwide	Tangerine® is electronic data collection software to enable recording of students' responses in oral early grade reading and mathematics skills assessments, specifically Early Grade Reading Assessment (EGRA) and Early Grade Mathematics Assessment (EGMA), and interview responses from students, teachers, and principals on home and school context information (these data are collected through a battery of surveys called the Snapshot of School Management Effectiveness, SSME).
	Mobile phones	Philippines	The USAID/Philippines BasaPilipinas activity enabled teachers to submit on-the-spot student reading performance test data from their classrooms to a database via mobile phones using SMS technology.
	Mobile assessment technologies	Kenya	The Tusome Early Grade Reading Activity is implemented in every public primary school in Kenya. Using Tangerine software, Tusome collects and analyzes classroom data through which stakeholders are able to gain actionable insights about what is working for teachers and students. MOE Curriculum Support Officers receive tablets to conduct classroom observation and student assessments, which enable them to evaluate the quality of program implementation and student learning. These data allow MOE decision makers to monitor progress and make informed judgments and adjustments when necessary.
Objective: Improve Equity			
Inclusion	Apps, audio files	Ethiopia	READ TA - Pilot initiatives to make the classroom environment more inclusive for students with special needs. The project screened children and adapted the grade 2 teacher's guide in all seven languages to incorporate inclusive practices. For students with vision impairments, it developed a multimedia lesson plan app that integrates audio files into phonemic awareness and story reading activities.
Increasing resources for low vision and blind learners	Braille, tablets, Tangerine app	India, Lesotho, Philippines	EGRA braille adaptations - In India, Lesotho, and the Philippines, All Children Reading conducted several of the first EGRA-Braille adaptations in the world. Assessors were trained to administer the braille EGRA on paper and on tablets. Scores were captured using the Tangerine® app and results were included in the EGRA baseline report.
		Philippines	The Reading Beyond Sight project supported students who have low vision or are blind and attend Grades 1 through 3 at public schools in the Philippines. The activity transcribed reading materials into formats accessible to students who have low vision or are blind; provided assistive technologies to schools; and trained teachers on equipment and technology use as well as parents and guardians on sensitivity and skills.
Increasing resources for deaf and hard of hearing	Various	Worldwide	All Children Reading Sign-On For Literacy Prize - The Sign-On For Literacy global prize competition supports technology-based innovations to increase sign language and literacy

	ICT Tool	Location	Example(s) of Application
children	Videos, Mobile App	Nicaragua	outcomes for deaf children in low resource settings. Innovations provide greater access to local sign languages, early grade reading materials, and/or reading instruction by engaging families, schools, and communities.
	Digital Library	Philippines	Señas de Sentido (Meaningful Signs), a three-pronged innovation by Manos Unidas and the National Deaf Association of Nicaragua, will create a corpus of Nicaraguan Sign Language including videos and Spanish translations, a language-learning mobile app with downloadable lessons, and a literacy outreach program to train parents of deaf children.
	Videos	Kenya	World Around You developed by the National Technical Institute for the Deaf in partnership with the Philippine Federation of the Deaf and De La Salle-College of Saint Benilde in Manila, will document and collect local sign languages and create an open-content digital library of folktales offered in an interactive bilingual format integrating local signed and written languages.
			Studio KSL, to be implemented by the non-profit eKitabu , will establish a local studio to document Kenyan Sign Language (KSL) through a visual glossary and produce KSL videos for integration into accessible books to be distributed across Kenya.
Objective: Provide Education in Crisis and Conflict			
	Digital gaming	Syria	EduApp4Syria mobile phone gaming apps to support Arab early grade reading instruction.
	Tablets, solar panels	Afghanistan	Use of ICT to enhance girls' knowledge and skills - In Afghanistan, where only 23.5 percent of girls go to school, USAID is working with the Ministry of Education to provide tablets and solar panels to support girls' preparation for the public university entrance examination.
		Pakistan	Youth and Technology Workforce Development Pilot Program - Through a public-private partnership with CISCO, USAID is working in the conflict-affected Khyber Pakhtunkhwa province, where extremism and instability thrive. To address the rising at-risk youth unemployment levels, the project leverages in-kind contributions from CISCO and public-sector infrastructure to equip marginalized youth with ICT skills and link them to employment opportunities.
Objective: Improve Education System Management			
Secure fund transfers	Digital financial services	Various	The Role of Digital Financial Services in Accelerating USAID Education Goals (2018) helps USAID practitioners understand how the targeted use of digital financial services (DFS) can support USAID education programming. DFS can promote greater time and cost efficiencies and transparency for education service delivery within, and outside of, the classroom.
		Liberia	The USAID Liberia Teacher Training Program upgraded the MOE's human resources system, helped establish a biometric identification system, vetted teacher payee lists to remove ghost workers, and issued biometric ID cards to a large portion of Liberia's MOE workforce. Teachers who receive their pay through mobile money reported 62 percent less cost and 97 percent less travel time to collect their salary.

	ICT Tool	Location	Example(s) of Application
Tracking and Tracing book distribution	Mobile phone apps and SMS messaging	Afghanistan Nigeria Malawi Cambodia	Afghan Children Read Project -Track and Trace technology - Low-cost tracking and tracing books solutions offer an effective way to improve distribution from point-of-origin to the student while also ensuring transparency and accountability. Drivers, delivery teams, and educators use the application and SMS tools to confirm the location and delivery of materials at each step of the way. Creative Associate's Track and Trace Initiative Tracking & Tracing Books software (video) - Alpha Field Test (Malawi) Track & Trace books - enables ministry officials, partners, and distributors to track in real-time the ordering and distribution of books and other supplies.
Education Management Information System (EMIS)	Smart phones, Tablets, Online dashboard	Ghana	Mobile School Report Card (mSRC) pilot - developed to systematically improve the Ghana Education Service's collection and reporting of data on the teaching and learning environments including enrollment, facilities, staffing, attendance, pedagogical functions, community participation, and funding.
Governmental financial reporting	Computer hardware and software	Ukraine	USAID is working with the Ministry of Education and Science to develop an electronic document processing system and pilot an electronic system for financial reporting between Ukrainian higher education institutions and the Ministry.
Objective: Improve Educational Opportunities for Youth			
Develop youth leadership skills	Use of social networks Online Learning Technologies, Social Media Applications	Myanmar, Cambodia, Laos, Thailand, Vietnam Worldwide	Connecting the Mekong through Education and Training (COMET) - improves youth employment with market-driven skills, increases technology-based learning solutions in universities and technical colleges, creates partnerships to link businesses and universities and technical colleges through work-based learning, and promotes gender-balanced employment in Myanmar, Cambodia, Laos, Thailand, and Vietnam. The Education for Children and Youth project (2013-2016) created an education leadership program as a partnership with the private sector, providing students with computer training. Upon completion, students received Microsoft certification, increasing their employment prospects.
Objective: Improve Higher Education Opportunities			
	Online platforms, cloud computing, software Online platforms and networking	Vietnam El Salvador	BUILD-IT Alliance partnered with Amazon Web Services and Oracle Academy to provide teaching and learning resources to partner universities in Vietnam. Teachers and students can access Amazon services including cloud computing technology, the Global Collaboration Portal, and training and technical resources to integrate new cloud curriculum and student projects platforms. Oracle Academy provided partners a complete portfolio of software, curriculum, teacher training, and support and certification resources. USAID/El Salvador's Higher Education for Economic Growth Project (2015-2019) established the Network of Female Leaders in Higher Education, the first inter-institutional

	ICT Tool	Location	Example(s) of Application
			<p>collaboration among universities and the Ministry of Education in El Salvador. This Network encourages the contributions of women to science and technology while providing better conditions for young women to access higher education (mainly in STEM careers).</p>

ANNEX B. 2018 USAID ICT4E HIGHLIGHTS OF DIGITAL LITERACY ACTIVITIES

Europe and Eurasia

Bosnia and Herzegovina - Restoring Civic Mission of Education (RCME)

DemCom programming supported educational projects for young people to learn the knowledge and skills they need to compete in the Bosnia and Herzegovina labor market. Three big events in Mostar—Find Your SPARK, BETAPITCH, and Tech Meetup—introduced youth to new technology and start-up activities, such as educational drone competitions and gadget shows, to learn about new technologies and meet potential employers. DemCom also funded the Knowledge Factory, providing youth with knowledge about small business, networking, and IT business skills

Georgia - Youth Entrepreneurial Skills

USAID's Youth Entrepreneurial Skills activity supported and co-financed three business projects that were based on technology and innovation. One was a web application for private tutoring sessions capable of providing a multitude of online and offline e-learning services for school children.

Kosovo

USAID partnered with Cactus Education to train 59 youth in ICT skills and 46 in entrepreneurship skills, and helped secure four full-time jobs and 16 internships for trainees in the ICT sector. These partnerships are helping improve workforce skills for out-of-school youth while creating a good platform for sustainable job creation, with the private sector playing a critical role in the process.

Ukraine - “Learn to Discern in Schools” media literacy pilot

The “Learn to Discern in Schools” media literacy pilot inoculated youth against disinformation by teaching middle school pupils to critically evaluate the information they receive through social media and television. The program added media literacy lessons to standard history, literature, and arts appreciation courses in 50 public schools in 4 cities, empowering future voters and leaders to make conscious choices about media they consume and share.

North Macedonia - Partnership with iVote

U.S. programs partnered with the local organization iVote to develop a platform with 20 online courses for youth with disabilities seeking to hone their employability skills and enter the fast-growing ICT sector. The courses focused on business, IT, and soft skills.

North Macedonia - WWW.Impact.MK

U.S. grants to 12 youth-based CSOs engaged more than 1,600 young people in 20 community actions using the platform www.impact.mk. This platform is used as a tool for community mobilization and networking, with more than 10,800 visits to date. A report published on dyslexia among high school students raised awareness in the MOE about assistance needed by dyslexic students. The website www.dyslexia-info.com continues to provide information on learning disabilities. More than 120 high

school students from Gostivar and Bitola who are interested in computer science and community activists received training to prepare for future employment in these areas. A mobile pilot application called “My Voice” was developed to enable students to participate in decision-making in a high school in Skopje.

Asia

Bangladesh – Combatting Violent Extremism (CVE) Youth Intervention

Through CVE interventions, youth were trained on exercising tolerance and Internet safety in order to discourage them from online interaction with extremist groups. The trainings were designed to encourage the young citizens to become positive change agents within their communities and educational institutions, ranging from universities to madrassas. One USAID activity improved youth employability and identified jobs based on their individual skills and interests by developing an online psychometric test with career profiles. Another USAID activity engaged youths through technology by conducting a hackathon for CVE for youths from all over the country, allowing participants to be part of the solution and to contribute meaningfully. The CVE activities were implemented countrywide, but focused mainly in Dhaka and Chittagong, the most densely populated cities in Bangladesh.

Burma - ICT Council's Ed and Tech Initiative

As part of this program, Google launched its Digital Literacy Initiative benefitting 10 schools.

Cambodia - Development Innovation Ventures

USG-sponsored hands-on mentoring encouraged Cambodian girls to design mobile application prototypes and business plans to address social and economic issues. Through the Development Innovations activity, the USG also supported the 5th Global Technovation Program in Cambodia in collaboration with three private sector companies and university partners, providing mentoring and business coaching for female youth. Technovation Cambodia 2018 helped a total of 188 Cambodian girls complete a three-month technical training and supported the “Technovation Cambodia National Pitch,” which afforded 14 teams, made up of 400 young female participants, opportunities to pitch their business ideas to judges.

Kyrgyz Republic - IT Skills in School Curriculum

In recognition of the growing need for IT skills in the modern digital economy, USAID integrated standards from the International Computer Driving License (ICDL) into the school curriculum in 11 secondary schools, and supported 17 IT teachers in attending ICDL training as a part of their preparation to offer the course to students in the 2018-19 academic year.

Kyrgyz Republic - Augmented Camp Program

This year’s Augmented Camp program taught students about the role of media and information literacy, while also focusing on subjects from previous camps including inclusion, civic engagement, and the importance of voting. After the camps, USAID provided ongoing support to camp alumni and their community initiatives through the Democracy Camp Alumni Network, which is a component of its Men

Ozum Chechem (“I Decide Myself”) youth outreach campaign. Twenty-two Democracy Camp alumni from 7 regions participated in post-camp discussions and training, reinforcing the sustainability of the camp alumni network.

Vietnam - Building University-Industry Learning and Development through Innovation and Technology (BUILD-IT)

In FY18, two Global Development Alliances (GDAs) leveraged nearly \$3.5 million from private sector partners in curriculum innovation and applying modern educational technology in the classroom in FY 2018. BUILD-IT attracted about \$485,000 in leveraged resources this year, demonstrating industry support for BUILD-IT and providing an encouraging sign that an industry-government-academia partnership on STEM education has traction beyond the five-year duration of the GDA. In higher education, by the end of FY 2018, more than 100 faculty members of USAID’s BUILD-IT Alliance have applied blended learning as a general model for integrating educational technology (EdTech) into teaching and learning. BUILD-IT’s project-based learning activities this year continued to maximize students’ experience with state-of-the-art technology and innovative solutions. Four partner universities participated in Engineering Projects for Community Service (EPICS). Through EPICS, 21 multidisciplinary student teams presented their innovative technology solutions for community’s environment, health, and social problems. Oracle Academy and Amazon Web Service supported more than 800 IT and computer science students to complete cloud computing, database, Java, and SQL courses.

AF/PAK

Pakistan - Partnership with Cisco

USAID’s three-year old partnership with CISCO to develop IT skills of youth in the Af/Pak region built the capacities of 3,185 students (558 female) and sponsored 3 job fairs to help match jobs and trainees.

Latin America and Caribbean

El Salvador - Juvenile Justice Strengthening Activity

Through an education leadership activity co-funded with the private sector, USAID provided underprivileged and at-risk, but high performing, public school students with an after-school educational program that reduces their risk of becoming involved with gangs. A private-sector alliance with Microsoft provided software for seven Supérate centers and facilitated student participation in seven technology fairs. In 2018, 100 Supérate female students participated in the DigiGirlz Event to encourage young women to explore the possibilities available in science, technology, engineering, and math.

Nicaragua

Through platforms such as “Train for the Job” from the Carlos Slim Foundation and the CISCO Academy, 125 youth were certified as trainers of trainers through CISCO courses offered under a regional agreement with Microsoft. In FY 2018, 1,075 youth obtained Workforce Development (WFD) certification; 49 percent went on to obtain new or better employment, and 89 percent continued studying six months after completing their courses. The TVET-SAY activity, a blended learning package that included the use of the online platform “Train for Jobs” offered by the Carlos Slim Foundation with

CLARO, participants were introduced to both technical vocational content, but also trained in social inclusion, emotional and social intelligence, diversity, human rights, ethics citizenship, social equity construction, community engagement, and environmental protection. To foster teamwork and problem solving, TVET-SAY also supported the participation of children and youth in the 9-12 and 16-19 age ranges in five robotics clubs in various municipalities on the Caribbean Coast. The Bluefields' robotics youth club volunteered free time and mentored younger children ages 9-12, introducing them to the basics of robotics, science, and math.

ANNEX C. ICT4E INTEGRATION IN SOLICITATIONS: EXAMPLES

USAID education staff are called upon to write Statements of Work and Program Descriptions as part of activity design. This annex contains recent examples demonstrating ways in which ICT4E was integrated into USAID education sector Request for Proposal (RFP) and Request for Application (RFA) documents. The RFPs and excerpts selected are intended to generate ideas about how solicitations can integrate ICT4E to support a variety of results.

Using ICT4E for data collection⁴⁴

Example 1

C.5.1.5: West Bank and Gaza Systems for Student Assessment in Reading and Writing Strengthened

...As part of strengthening the policy framework for the effective implementation of early grade reading and writing instruction, EGR assessment specialists will work with (Ministry of Education) psychometricians and evaluation experts to institutionalize the administration of Palestinian early grade reading and writing tests for the end of kindergarten and the end of grade 2. Together, they will:

- Develop and/or adapt the system of data collection on early grade reading and writing to include cost-effective, sustainable, and appropriate use of ICT to more effectively collect data and facilitate communication of that data back to the central level MOE.

Using ICT4E to support development and/or distribution of reading materials:

Example 1⁴⁵

C.5.2.1: Evidence-Based Essential Reading Materials for Grades K-2 Distributed to Classrooms

...The Contractor is encouraged in its proposal and implementation to consider the use of the open-source Bloom software.....; leveraging either mobile or tablet technology to augment the number of titles available per school, classroom, and student; and/or any other approach the Contractor believes will be both cost-effective and successful in producing high-quality instructional material that follows both the Palestinian curriculum and a scientifically derived scope and sequence in Modern Standard Arabic...

Example 2⁴⁶

(Requirements for) Developing Early Grade Reading Materials for Teachers:

- Print student and teacher materials utilizing local print houses....The Contractor must also consider incorporating cost-effective information and communications technology (ICT) options to facilitate production of materials, paper size, paper weight, and binding, as well as the expected shelf-life of materials (taking into account anticipated revision of materials) and whether they will be reusable or for one-time use only.

⁴⁴ Early Grade Reading Activity, USAID/West Bank, RFP # SOL 294-17-000004, Issued March 3 2017, pg. 24-25.

⁴⁵ Ibid., RFP # SOL 294-17-000004, Issued March 3 2017, pg. 26.

⁴⁶ Ibid., RFP # SOL 294-17-000004, Issued March 3 2017, pg. 29.

- Help ensure efficient and effective distribution of the materials to each student and teacher in the appropriate classrooms in time for each school year in accordance with the approved Implementation Plan, and taking into consideration delivery costs and logistics, and incorporating cost-effective ICT options to facilitate distribution and tracking of materials. The use of open-source tracking and tracing software systems is encouraged in order to be able to ensure maximal efficiency in book delivery to every child and teacher in the EGR.

Example 3⁴⁷

Activity I: Materials Development

- Develop or adapt appropriate supplementary materials for use in schools, such as low cost sets of decodable and leveled readers and story cards. These materials may be print or electronic, such as a downloadable digital catalogue. To the greatest extent possible, materials shall be made available for use on the laptops that the GOK plans to disburse to primary schools nationwide.

Considerations:

- Expected shelf-life of materials, whether reusable or for one-time use.
- Printing costs (preferably using local Kenyan printers).
- Preparing and printing materials in both English and Kiswahili so that Tusome content is integrated and reinforced equally across languages.
- Incorporating cost-effective ICT options to facilitate material development, publication, and/or distribution of materials.

Example 4⁴⁸

Sub-IR 3.4: Expand (or develop) innovative platforms and delivery mechanisms to sustain reading material availability (e-platforms, distribution cycle)

USAID/Kyrgyz Republic is committed to integrating Science, Technology, Innovations, and Partnerships (STIP) into our foreign assistance development activities. As such, the Time to Read! contractor shall develop innovative approaches to support primary students' reading development....

Required components:

- Create online repository for all training materials developed during this activity for continued use and increased access to information for sustainability
- Produce best practices video clips and incorporate into project training materials

⁴⁷ Tusome Early Grade Reading Activity, USAID/Kenya, Request for Proposal (RFP) # SOL-615-13-000022 for the Tusome – Early Grade Reading Program in Kenya, issued November 1, 2013.

⁴⁸ Kyrgyz Republic Basic Education -"Time to Read!" Activity, USAID/Central Asia, Request for Proposal (RFP) #SOL-176-16-000003, issued April 2016, pg. 24.

Illustrative areas of work:

- Technology-delivered platforms for instruction, reinforcement, monitoring, and/or assessment (i.e., best practices video clips, reading “apps,” online repository for reading instruction materials, use of mobiles/tablets for instruction or assessment)
- Increased access to educational materials via technology (i.e., digitized books, e-Libraries, mobile “apps” supporting reading skill development)
- Innovations that are inclusive in nature and that would assist students with disabilities to access the reading curriculum and develop primary reading skills
- Development of media campaigns promoting reading and a culture of education
- Incorporation of USAID STIP principles
- Explore and provide innovative, alternative technology-based platforms, appropriate to the Kyrgyz context, to deliver the reading materials developed under this Activity Result. For example, “apps,” mobile phones, tablets, computers, television, and/or radio

Example 5⁴⁹

...The Contractor must utilize local print houses to produce materials. Printing subcontracts must be firm-fixed-price type subsequent to first print runs, which may be necessary to subcontract as cost reimbursement to determine costs and meet the Government of Nepal materials price point.

Considerations:

- Paper size, paper weight, and binding
- Expected shelf-life of materials, whether reusable or for one-time use
- Printing costs (using local Nepali printers)
- Delivery costs (challenging topography and remote schools)
- Incorporating cost-effective ICT options to facilitate material development, publication, and/or distribution of materials

Using ICT4E to support teacher coaching and/or supervision:

Example 1⁵⁰

C.5.2.3: Coaching of Early Grade Reading Instruction Improved

⁴⁹ Early Grade Reading Program (EGRP) in Nepal, USAID/Nepal, Request for ABE LEARN Task Order Proposal (RFTOP) # SOL-367-15-000006, issued November 2014.

⁵⁰Op. cit., USAID/West Bank, RFP # SOL 294-17-000004, Issued March 3 2017, pg. 32.

...The Contractor must, in its proposal, provide detailed information about the observation forms and coaching materials it will prepare to support coaches in their tasks. (Note: USAID’s experience since 2011 is that technology can be of great assistance in implementing a successful coaching plan.) The Contractor is encouraged to propose evidence-based uses of technology to complement, but not replace, the on-site mentoring in which coaches will engage. These technological applications should assist in the compilation, tracking, and analysis of information on teacher practice, and enable (Ministry of Education) actors at both the central and decentralized levels to use this compiled information to plan professional development and training interventions in early grade reading.

Example 2⁵¹

Activity 7: System for teacher supervision support

Develop a simple, sustainable system for teacher supervision support from school heads, TAC Tutors/coaches, QASOs, and formative student assessment in Standards 1 and 2 that: addresses teacher absenteeism and poor time-on-task levels; includes setting goals for teacher practice and student learning; monitors and supports progress toward those goals; allows teachers to focus on elements of reading instruction they have not yet mastered; and periodically assesses teacher practice and student outcomes. Work with MOEST to implement recommendations from the Snapshot of School Management Effectiveness research.

Considerations:

- Incentives to promote ongoing supervision
- Inclusion of practical instructional modalities and “troubleshooting” pieces for teachers via individualized coaching sessions
- Regular school visits to assess progress and provide constructive feedback
- Sensitization by TAC Tutors and coaches of local parent teacher associations (PTAs) and school management committees (SMCs) in the EGR methodologies during their ongoing school visits
- Face-to-face monitoring and follow-up support in innovative and cost-effective ways (e.g., ICT) that are inclusive of private sector, communities, and civil society.

Example 3⁵²

IR 1.4 Coaching and Supervision of Early Grade Reading Instruction Improved

This sub-result focuses on strengthening MINEDH systems for coaching and mentoring teachers on their use of gender-responsive, evidence-based reading materials and teachers’ guides. Outcomes under this sub-result will be measured from teacher observations.

⁵¹ Op.cit., Request for Proposal (RFP) # SOL-615-13-000022 for the Tusome – Early Grade Reading Program in Kenya.

⁵² Request for Task Order Proposal (RFTOP) # SOL-656-16-000001, Nisome! (Let’s Read) Program under the ABE LEARN IDIQ, USAID/Mozambique, issued December 2015.

Under this sub-result, the contractor shall:

- Develop observation forms intended to provide data about teachers' use of the Emakhuwa and Elomwe materials and scripted lessons, using existing observation forms for coaching reading instruction whenever possible...;
- Develop paper-based, and cell phone or tablet-based, versions of these classroom observation and teacher coaching tools; USAID/Mozambique requires the use of these Information and Communications Technologies (ICT) formats to be linked to a central database whenever possible for all data collection on teacher instructional practice...

Using ICT4E to support family and community engagement

Example 1⁵³

C.5.3.2 Family awareness of and engagement in supporting reading increased

...The Social Behavior Communications Change (SBCC) campaign will unfold in an iterative fashion throughout the life of the EGR activity, with feedback data used to update the plan annually in collaboration with the (Ministry of Education). It will be conducted both in dialect and Modern Standard Arabic, and exploit all technologies (radio, television, mobile phones) indicated for communication with the greatest number of parents possible...Overall, the reading communications strategy and associated SBCC campaign should be simple, results-focused, and cost-effective so that the (Ministry of Education) and local organizations can sustain this effort.

Example 2⁵⁴

Community engagement serves as a central pillar of the implementation of this contract. Within the first six months of contract implementation, the Contractor must engage key leaders, stakeholders, female and male youth, and their families in the targeted communities to explore their potential role in building the youth workforce, invite their participation and partnership, and provide continued support to the youth.

Activities

The Contractor will undertake at least twelve (12) community engagement campaigns that will target at least 6,000 heads of households and prominent figures in the community. These campaigns should involve the following activities:

- Develop modalities to build youth/adult or peer-to-peer mentoring for youth, including through mobiles/Information Communications Technology (ICT)/social media.
- Develop media coverage of youth development and entrepreneurship issues.

⁵³ Op. cit., USAID/West Bank, RFP # SOL 294-17-000004, Issued March 3 2017, pg. 36.

⁵⁴ Punjab Youth Workforce Development, USAID/Pakistan. RFP # SOL-391-15-000018, Issued March 2015.

- Organize targeted events and informational campaigns to raise awareness of vocational training and employment opportunities among youth, their families, and private-sector employers, especially around emerging technical fields.

Example 3⁵⁵

Sub IR 3.1: Community awareness of the importance of language of instruction (LOI) increased.

Required Activities under this sub IR include:

IR3.1.1 Design and implement awareness and advocacy campaigns to promote the use of selected language of instruction specifically as related to early grade reading....

...IR3.1.4 Identify ways, potentially including low-cost ICT, to involve community authors and illustrators to develop supplementary reading materials for students in selected languages to use in the home and at school, complementing instruction.

Sub IR 3.2: Family engagement to support reading increased

Required Activities under this sub IR include:

IR3.2.1 Orient parents and family members on using locally produced early grade reading materials with their children such as story cards, books, or other materials that facilitate the organization of family “story times.”...

...IR3.2.3 Propose innovative methods to engage both parents and children with local language cell phone applications to promote home-based early grade reading practice.

Using ICT4E to support mobile banking⁵⁶

L.10. Mobile Banking

...USAID encourages host country governments, bilateral and multilateral development partners, contractors, subcontractors, grantees, sub-grantees, and private sector alliance partners to help strengthen the financial services sector in the countries we work. Where programs propose cash distributions, partners should consider incorporating electronic payment systems into program design and implementation where feasible, thereby reducing reliance on physical cash.

If you are considering the use of electronic payments in your operations and programs, please include in your proposal a brief explanation of the selected method of electronic payment, and where feasible, how you propose to reduce the reliance on physical cash. Examples of operational costs that can use e-payments are: temporary staff salaries; vendor payments; travel per-diem for staff. Examples of program costs that can use e-payments are: cash for work payments; payment to trainers or trainers of trainers; direct grants to beneficiaries. This discussion of the type of payment is for informational purposes and

⁵⁵ Op cit., USAID/Nepal, Request for ABE LEARN Task Order Proposal (RFTOP) # SOL-367-15-000006.

⁵⁶ Op.cit., Request for Proposal (RFP) # SOL-615-13-000022 for the Tusome – Early Grade Reading Program in Kenya. Note that this example is taken from the RFP’s Section L “Instructions to Offerors.”

for our understanding of how you propose to pay recipients/beneficiaries. This information will be used by USAID to understand and measure the impact of USAID’s promotion of the use of electronic payments by implementing partners. The information provided in your proposal will not be an evaluation factor unless specifically stated as such in the evaluation criteria in this solicitation document.

Using ICT4E to support youth workforce activities:

Example 1⁵⁷

C.3.4 Component 4: Entrepreneurship and Career Development Support

Activities

- Support delivery of career development services including identifying specific job opportunities and internships, counseling in interviewing and CV writing skills, and job-seeking assistance including via electronic media; and work to mainstream and sustain these approaches.

C.3.5 Component 5: Institutional Capacity Building

...The Contractor will also explore innovative solutions, such as mobile and ICT based solutions, to expand the outreach of training institutions via technology, improve delivery of up-to-date content and reduce costs.

The Contractor must centrally manage the below cross-cutting activities:

- An Information Communication Technical (“ICT”)-enabled project platform that allows the Contractor share data, programmatic materials, and lessons learned.

Example 2⁵⁸

I.7.2.a Access Practices

LAC institutions need to build the capacity to reach out and retain students who have not traditionally had access to tertiary education....This program needs to work with the target institutions to develop and implement innovative approaches to identify and address the most significant barriers to equitable access for disadvantaged groups. Recipient should consider leveraging technology and other innovative means to reach more of the targeted beneficiaries.

Illustrative activities:

- Develop alternative forms of delivery of courses to better address the needs of students from the target population, such as flexible schedules for non-traditional students.

⁵⁷ Op. cit., USAID/Pakistan. RFP # SOL-391-15-000018, Issued March 2015.

⁵⁸ Regional Workforce Development Program, USAID Bureau of Latin America and the Caribbean, Office of Regional Sustainable Development (USAID/LAC/RSD), Request for Application (RFA) #RFA-OAA-15-000011, issued April 2015.

- Create blended learning and distance learning opportunities for rural students or consider the use of massive open online courses (MOOCs). Consider correct media for context and availability of technology.
- Develop outreach systems and activities, considering all available avenues, such as print and social media, and other regionally specific outreach tools.

Using ICT4E to be supported by activity funding mechanisms⁵⁹

Illustrative uses of the *Tusome Partnership Fund* include:

- Update of the supply chain for reading materials, in partnership with publishers and distributors
- Development of locally made, low-cost materials with youth, communities, civil society, or other stakeholders
- Piloting of innovative ICT approaches to support sub-IR I.I.
- Digitization of Tusome/PRIMR and support materials for use on GOK laptops.

Illustrative uses of the *Tusome Youth Fund*:

- “Literacy brigades” Youth-led businesses to prepare and distribute locally made, low-cost materials
- Reading advocacy campaigns
- Youth coaches” to support non-formal schools
- Youth ICT technicians to support digitization of Tusome materials for use on GOK laptops

Emphasizing general ICT4E use in the RFP

Example 1⁶⁰

Note: While integrating ICT4E throughout a solicitation is the recommended approach, having a standalone section such as this one that supplements this integration can be an effective practice.

C.6.5 Information and Communication Technology

(The EGR Activity) should only integrate technologies that improve the efficiency and effectiveness of specific education interventions as well as activity operations. The focus must be on improving educational processes and making them more effective, decreasing costs, and enabling the development of new practices and innovation that have a positive impact on results in reading. The integration of ICT into the activity must take into account a range of factors that may affect implementation, uptake, and sustainability (e.g. budget; total cost of ownership; infrastructure teachers’ skills; organizational capacity).

⁵⁹ Op.cit., Request for Proposal (RFP) # SOL-615-13-000022 for the Tusome – Early Grade Reading Program in Kenya.

⁶⁰ Op. cit., USAID/West Bank, RFP # SOL 294-17-000004, Issued March 3 2017, pg. 45.

Within this framework, ICT must be integrated in a way that supplements core, evidence-based interventions that have been proven to achieve results in improvements in reading. Opportunities for efficiencies and cost savings resulting from use of technology must also be identified through activity operations (e.g. data collection via mobile devices; mobile payments). For example, consideration must be given to using ICT for monitoring and evaluation (e.g. conducting data collection and transfer using tablets/mobile phones) as well as monitoring and evaluation of ICT (e.g. instructional support materials for coaches/tutors/teachers on a tablet). The Contractor must demonstrate in its proposal as well in the activity's implementation the application of these understandings.

Example 2⁶¹

1.6.7 Innovation and Technology

It is expected that Recipient will leverage innovative ideas or new or adapted technologies in capacity building efforts and to improve student and alumni remote access to resources and services. Information technology (IT) solutions must be well thought-out, sustainable, and feasible to launch and maintain in the Latin America and Caribbean context. Recognizing that IT solutions conceived under development projects are rarely sustainable and do not always achieve the intended impact, any IT solutions should be leveraged in a pragmatic manner to reduce cost of service delivery, to achieve scale, and improve monitoring and evaluation capabilities.

Example 3⁶²

From Section L “Instructions to Offerors”

L.8.1 Technical Approach (See Section M.4.1)

The Offeror must demonstrate how it will utilize ICT, especially mobile technology (and electronic payments and other mobile banking services for contract-related transactions) and electronic learning platforms, to implement contract activities and achieve the contract's objectives.

⁶¹ Op. cit., Regional Workforce Development Program, Request for Application (RFA) #RFA-OAA-15-000011.

⁶² Op. cit., USAID/Pakistan. RFP # SOL-391-15-000018, issued March 2015.

ANNEX D. SAMPLE ICT4E LEARNING AGENDA QUESTIONS

The ICT4E-focused questions below were adapted from work that E3/ED teams are doing to develop thematic learning agendas that inform priority areas of USAID education work. Missions and operating units are encouraged to work with E3/ED in developing learning agenda questions tailored to their specific projects and activities:

Education in Crisis and Conflict

1. Equity - Which technology delivery modalities are the most effective at improving equitable access to education in crisis and conflict contexts?
2. Data Monitoring and Evaluation - What are innovative technology-leveraged approaches to and methods for collecting reliable education data in complex changing environments affected by crisis and conflict?

Youth Workforce Development

1. Soft Skills - How might technology-leveraged instruction/platforms advance measurement of soft skills outcomes, including self-report assessments, use of observations, or other items such as situational judgement or anchoring vignettes?
2. Literacy and Numeracy - What are effective technology-leveraged instructional modalities to support youth in achieving minimum level of literacy/numeracy?
3. Reading - What are effective, appropriate technology-leveraged instruments for measuring reading outcomes among older, out of school youth?

Literacy, Numeracy, and Social-Emotional Skills

1. Coaching and Mentoring - How can we best use technology to support teachers from a distance, especially in remote areas?
2. Inclusive Education - What technology-leveraged methods work best to screen learners with disabilities?
3. Books and Materials - What is the relative cost effectiveness and accessibility of digital versus print teaching and learning materials both inside and outside of the classroom?

ANNEX E. GLOSSARY OF TERMS

The glossary below is taken from *First Principles: Designing Effective Education Programs Using Information and Communication Technology (ICT): Compendium* (USAID, 2011). The following additional sites can also serve as resources for understanding current ICT-related terminology in the fast-paced context of technological change:

- https://www.fhi360.org/sites/default/files/media/documents/2M4DHandbook_August2014-New.pdf (A Glossary of Terms begins on page 133.)
- <https://www.state.nj.us/education/techno/glossary/>
- <https://www.pcmag.com/encyclopedia> (The “encyclopedia” on this site has general ICT terms, not specific to education.)

Active learning: A broad term for classroom or online processes, such as collaborative learning or project-based learning, in which students are engaged in guided activities that promote learning; related to “learning by doing,” among other concepts.

Action research: A process of structured reflection and problem solving, typically conducted as part of a group (or “community of practice”) to improve an individual’s approach to a specific activity; a method of professional development for teachers.

ADSL (Asymmetric Digital Subscriber Line): A form of broadband connectivity provided by telecommunications companies using existing telephone lines, providing relatively fast transfer of information via the Internet.

Assessment: The act of measuring knowledge, skills, and performance, usually in the service of learning.

Bandwidth: The amount and rate of transmission capability of an electronic device. Typically measured in bits per second for digital devices (like computers) and in cycles per second for analog devices (such as radio). It is the range of frequencies that can be transmitted by phone line, fibre-optic cable, wireless, or T-1 line.

Blog (or Web Log): A publicly accessible journal available online, often allowing visitors to the blog to comment on entries; group blogs may feature the writing of several, hundreds, or thousands of individuals.

Broadband: A telecommunications signalling method with a wide range of frequencies, enabling faster transmission of data; often fibre-optic cable or ADSL.

Chat (or Instant Messaging): **Instant messaging (IM)** technology is a type of [online chat](#) that offers [real-time text](#) transmission over the [Internet](#).

CAI (Computer Assisted Instruction): A means of delivering educational content and related problem sets in which the learner’s performance is assessed automatically and frequently, with assessment resulting in delivery of new content to address deficiencies.

Collaborative learning: Education that relies on any of several frameworks for activities in which students work together to solve problems, find and structure information, or create reports, playscripts, or other materials; often used interchangeably with “cooperative learning,” although cooperative learning may be used to refer more specifically to pedagogical techniques involving structured assignments and assessment protocols.

Connectivity: The ability to access an electronic network to send and receive information between locations or devices; connectivity is typically provided using telephone lines, wireless signals, satellite communications, and other, similar means.

Cooperative learning: See “collaborative learning.”

Curriculum: A fixed course of study in a particular subject area at a certain developmental point (e.g., age or grade), in which students address specific, related topics and skills and are assessed on those topics and skills.

Direct instruction: A teaching method involving demonstration, explanation, and exercises or practice; used in connection with ICT, a use of a dedicated learning technology, such as educational software or instructional videos.

Distance Education (DE): Courses typically at the college level (but also including agricultural extension and other non-formal forms of learning) in which students do not visit a school campus for every class; in developing countries, often relying on printed materials and the postal service, but increasingly making use of computers, the Internet, mobile telephony, and other means.

E-book: Electronic book that can be viewed on a computer, e-book reader, or other device.

E-book reader: Lower-cost and low-power computing device dedicated for use with e-books.

E-learning: A style of learning in which students interact with digitally delivered content, services, and support, often including a distant teacher; although most widely applied to Web-based learning, e-learning is also used to refer to learning via satellite TV, DVD, and/or CD-ROM, and is in many instances a sub-set of DE (see “Distance Education”).

EMIS (Education Management Information System): A technological system for collecting, storing, retrieving, and analyzing information about an education system to support planning and administration. EMIS typically involves teachers and schools uploading data to a central system. Information may include anything from student attendance and grades to the size and condition of school facilities.

E-waste: Discarded electronics equipment, including computers, mobile telephones, digital cameras, and other hardware. E-waste can pose health risks for communities and for workers.

Formative evaluation: Several types of evaluation that are conducted to help shape or monitor projects before or during implementation.

Geographic Information System (GIS): Hardware and software used to store, retrieve, map, and analyze geographic data, usually oriented in relation to Earth coordinates.

Indicator: A variable used in program evaluation to measure change in a process or condition.

Information and Communications Technology (ICT): Any technology (mainly digital but also analog) that allows users to create, store, display information in all its forms (text, images, video, audio) or communicate with others over a distance, such as computers, television, handheld computers, radio, audiocassettes, DVD and CD players, cell phones, networks, and the convergence of any of these technologies.

Internet: A network of networks with worldwide scale, in which millions of computers are interconnected through standardized protocols (TCP/IP).

ISP (Internet Service Provider): An entity that provides individuals and organizations access to the Internet.

LAN (Local Area Network): A network connecting computers that are in the same physical location, such as a school or classroom.

MP3 and MP4: Compression technologies for audio and video files, respectively; these techniques assist transmission of music and video files over the Internet by making the sizes of the files smaller.

Netbook: An inexpensive laptop-style portable computer that typically provides limited processing power, uses solidstate storage memory instead of a hard disk drive, and has long battery life.

One-to-one (or 1:1) computing: Classroom-, school-, district-, or system-wide provision of computers, typically laptops, to students. Laptops and other mobile devices enable students to use computers in all classes and at home.

Open Educational Resource (OER): Public-domain teaching and learning resources that can be freely used, repurposed, and adapted.

Open Source: Refers to any program whose source code is made freely available for use and modification as users or other developers see fit. Also sometimes referred to as “Free and Open Source Software” (FOSS) and “Free/Libre and Open Source Software”.

Outcome: The effect of program or project activities on the beliefs, behaviors, skills, knowledge, attitudes or affect of the targeted population. Outcomes can also be non-personal: access to resources, changes in policies, improvements in environmental conditions, etc.

Pedagogy: The science of teaching and the methods used to teach.

Podcasting: A method of publishing audio broadcasts via the Internet, allowing users to subscribe to a feed of new MP3 files that can be downloaded to portable music players or to computers. Podcasting uses a syndication model—such as RSS—to deliver an enclosed file automatically. Podcasting enables independent producers to create self-published, syndicated “radio shows,” and gives broadcast radio programs a new distribution method.

Professional Development (PD) or Teacher Professional Development (TPD): The provision of learning opportunities to teachers intended to enable them to advance their knowledge of their subject areas,

their teaching practices or other components of their careers in education. Typically indicates learning opportunities that are both more broad and more focused on pedagogy than those provided in “training”; often qualified as “pre-service” and “in-service.”

Smart phone: A mobile device that offers the features of a mobile telephone (voice calls, SMS) as well as the ability to run small software applications (“apps”) and to connect to the Internet to provide email, web browsing, and other data communication services.

SMS (Short Message Service): A service that allows short text messages to be sent between mobile phones.

Summative evaluation: An assessment of the results of a project to determine the effect that the project had, typically in relation to its objectives.

Sustainability: The capacity of a program, project, or other intervention to continue its activities over time.

Tablet PC: A computer contained in a single panel, typically a touch-screen, for inputting commands, keystrokes, and other information.

Technology integration: The use of technology by teachers and students as a tool to support learning objectives, enhance instruction, and improve student learning in any subject in the school curriculum (exclusive of IT courses). Technology integration may be designed to build students technology skills, but only in the course of improving their mastery of curriculum content.

Text-to-speech: The conversion of electronic text into voice output using speech-synthesis technology; a computer or other device “reads” the electronic text aloud; used to support visually impaired, low-literate, and early readers.

Thin-client network: A LAN that links computer terminals (“thin clients” or “dumb terminals”) to a server that provides them with software applications and information-processing services. The server may also be used to store users’ data.

Total Cost of Ownership (TCO): A method of developing financial estimates of the cost of purchasing, maintaining, and disposing of computer hardware, software, and systems. TCO estimates may include installation, training, electricity, or other costs associated with purchase and use.

Twenty-first century skills: A description of skills involving independent learning, problem solving, communication, and collaboration, as well as many others, typically applied to the kinds of knowledge and capacities that individuals will need to thrive in a global knowledge society or knowledge economy.

Virtual Private Network (VPN): A secure (private) network, such as a network available only to schools, that is configured within a larger network, such as a commercial telecommunications network.

Voice Over Internet Protocol (VOIP): A means of using the Internet to support voice telephony.

VSAT (Very Small Aperture Transmission): A small, earth-based transceiver that transmits digitally to satellites at high speeds.

Wireless: The ability of one ICT device (computer, cell phone) to communicate with another without cables or wires.

World Wide Web: An information-representation method that operates via the Internet to enable users to access resources that may contain text, images, and sounds, and that display in a standard fashion on many computers and software applications.