DATABASE AT A GLANCE

Educational Technology

INTRODUCTION

Educational technology programs around the world — and especially in low- and middle-income countries — are taking advantage of rapid increases in internet and mobile connectivity to bolster students’ access to and quality of education. As of 2014, more than 30 percent of households in LMICs had internet access, compared to less than 10 percent in 2005. Moreover, in 2014, there were about 90 mobile phone subscriptions for every 100 inhabitants in the developing world, as opposed to 23 just 10 years prior. Many educational technology programs utilize this growing prevalence of technology to reach greater audiences; some take advantage of the speed of technology to make learning and teaching faster, easier, and more efficient; and others connect students, teachers, and educators to those not only in their communities but also around the world so they have access to more materials and resources than ever before.

The Center for Education Innovations (CEI) has identified more than 130 such educational technology programs in its database. Among these, more than half of them serve students in Sub-Saharan Africa, and approximately one-third target those in South Asia. Across all geographic regions, about 20 percent of the programs are implemented by for-profit organizations, 70 percent by non-profits, and 10 percent by organizations that are a hybrid of the two models. About 45 percent provide student support, such as learning materials; 30 percent provide school support, such as training for teachers and school leaders; more than 20 percent focus on delivery, or direct provision of education. Almost all of the programs report that they reach low-income populations in some way, and 40 percent target the bottom-two income quintiles exclusively.

1. International Telecommunication Union World Telecommunication/ICT Indicators database
2. ITU World Telecommunication/ICT Indicators database
3. Analysis dated May 2015
COMMON THEMES ACROSS PROGRAMS

Four key emerging themes and characteristics common across many of the innovative educational technology programs featured in the CEI database include:

1. Providing increased access to learning materials through provision of technology

The majority of educational technology programs aim to improve learning outcomes, especially by targeting communities and students in rural, underprivileged, remote, or conflict-affected areas. More than 20 percent of educational technology programs in CEI’s database do so through direct provision of hardware or by establishing community technology centers so that students have greater access to learning materials online.

Many such programs provide a specific item of technology, which are typically computers, but can also be Internet connection, mobile phones, or, to an increasing degree, tablets. Through these devices, students have greater access to learning materials. **Kenya Computer Exchange** provides computers to underfunded schools through donations from private and corporate sponsors. The Kenya Education Fund, which implements the program, requires these recipient schools to allow select students from disadvantaged backgrounds to attend the school for free.

In some regions, communities consolidate their resources and work with program implementers to establish free centers equipped with technology, so the entire community has access to additional learning materials. For example, in Burma, when community-based organizations provide the physical space and volunteers, **New Education Highway (NEH)** supplies the learning materials, computers, and technological training for free communal learning centers that especially target disadvantaged groups such as women and ethnic and religious minorities. The computers have access to open educational resources that cover a standard K-12 curriculum, advanced math and science, and test preparation, as well as a range of other topics.

2. Delivering software and learning content for free or at reduced costs

Almost 30 percent of educational technology programs in CEI’s database focus more on the software and learning content, rather than the hardware; they develop or deliver open educational resources that can be utilized by students worldwide or provide content based on a country’s specific curriculum at reduced costs.

Many of these programs develop or curate content applicable to students around the world and deliver them to those who would otherwise lack access to such resources. **Library for All**, which launched in Haiti, provides students in developing countries access to age-appropriate and culturally relevant reading materials in French, Spanish, Haitian Creole, and English. The cloud-based library consists of content from both international and local publishers, NGOs, and open educational resources. The materials can be accessed on tablets or mobile phones; the organization’s partners, which are established NGOs, donate or find sponsors to provide these reading devices.

Other programs offer digital versions of materials based on their country’s specific curriculum, reducing costs for students and their families. For example, **Kytabu**, an app with digital versions of Kenyan textbooks, provides a low-cost option for accessing textbooks by allowing students from low- and middle-income families to rent by the page or by the chapter, depending on their need and budget. Similarly, schools participating in the **Migration to e-Learning** program can pay an annual licensing fee of 300 South African Rand (about 25 US Dollars) for each tablet that has students’ textbooks preloaded on them as e-books, significantly lowering costs for students’ parents, who may spend about R2,000 ($170) per year on textbooks. The program also offers its digital library of educational content, including materials from National Geographic and Wikipedia, as well as TED talks, at reduced prices.

3. Offering instructional materials and training for teachers

About 20 percent of the educational technology programs in the CEI database provide some form of support to teachers, whether it be through teaching materials, such
as lesson plans or student activities, teacher training, or support from fellow teachers.

A majority of these programs use technology to disseminate teaching materials such as lesson plans, activities for students, and tips on effective teaching techniques. Nokia Life+ English Teacher, implemented by Nokia in partnership with UNESCO, targets those teachers who are in areas with little access to teaching support with a free app that delivers resources and activities through their mobile phones. The content is similar to what is taught in teacher training colleges and is frequently updated with new professional development articles and learning activities. In Pakistan, Socio Engineering Consultants also provides teaching materials, but it does so through its Interactive Whiteboards — instructors have access to multimedia teacher notes and questions banks displayed directly on their touch-screen whiteboards, on which they can directly highlight content and maneuver through information and data. To aid instructors in maximizing the value of the whiteboards, the program also offers a range of training materials on the technology.

Like Interactive Whiteboards, many programs supplement their teaching materials with teacher training, but some put a greater emphasis on the latter. For example, in addition to supplying schools with computers, UNETE stresses the importance of training, communication, and online education through its mentorship program, whereby recent college graduates support teachers as they receive training on how to use the new computers. Through partnerships with state governments, private foundations, and technology companies, UNETE has reached more than 6,800 schools, or about 10% of elementary and junior high school students in Mexico. In Ghana, Sesame Workshops and IDP Foundation have jointly aggregated interactive resources and tools and 10 teacher training video modules on engaging teaching techniques into a Techniques for Effective Teaching Kit. These videos, produced on DVDs, were distributed in tandem with a series of master trainings targeting head teachers and administrators, who could in turn train teachers to maximize the impact of the kits.

Teachers can also interact with geographically distant peers using technology. With SoukTel PeerNet, they can reach out to other teachers signed up for the service for support, additional teaching materials, or teaching techniques. The group members text questions to a hotline, and all members can see both the questions and responses.

4. Creating a platform for students around the world to interact

With increasing access to technology around the world, students can more easily connect with other learners.

More than 10 percent of educational technology programs in the CEI database facilitate this connection by offering a platform for these student interactions or by directly partnering students to foster greater cultural understanding.

Through the Fundaza Developing Young Writers Programme, student-writers can publish their works on the Fundaza network for a broader and more diverse audience than their local peers. Other students can comment with their opinions or discuss these published works with other readers. Nafham also encourages student-to-student interaction with its crowd-teaching model whereby students, as well as parents and teachers, can submit a video on a particular lesson in line with the curriculum.

Many other programs facilitating student interaction focus on fostering greater cultural understanding by encouraging the discussion of global issues among students. With UNICEF’s Connecting Classrooms, students go through a curriculum designed by the U.S. Fund and write about topics local to their communities. The students then post their thoughts on an internet platform, stimulating an active dialogue about global issues with students on multiple continents, while also developing their communication and technology skills. PenPal Schools assists with more direct connections and partners students from participating classes with a student from any one of 37 countries worldwide. The students complete weekly modules consisting of an original video, a news article, and a set of discussion questions on global issues such as poverty, environment, and technology, and they then exchange their perspectives and cultural norms on the topic and can share personal stories about how the issues have affected their lives.
5. Delivering lessons on skills for work

With technology, programs can more efficiently deliver lessons on skills for work to a wider audience, increasing students’ employability and putting them on track for financial independence. Ten percent of educational technology programs in CEI’s database do so; such programs may provide training in general skills or in IT, and many offer continued professional support even after students’ completion of the program.

One such program in East Africa, Shamba Shape Up, a locally produced TV series on agricultural development, demonstrates practical, accessible, and affordable methods that may help small-scale farmers to effect improvements on their farms. Viewers can also text in specific questions or request free leaflets on a particular topic.

With the increasing utility of ICT-related subjects, other programs help students specifically develop skills for jobs in those fields. W.TEC Girls Technology Camp, which targets young women with an interest in information and communications technology (ICT), offers skills training for jobs in computer engineering, programming, and system analysis, among others, or for self-employment. The program also encourages women to use these skills for other purposes such as activism or advocacy. Similarly, Edunova ICT Human Resourcing for Schools recruits unemployed youth, trains them in ICT support, and employs them in schools — usually in their local community — that have acquired ICT facilities and equipment. Through this model, students have a wealth of employment opportunities and schools and their surrounding communities have a reliable source of skilled workers. Digital Divide Data (DDD), which offers a 3- to 8-month program during which students learn basic ICT skills and English, also employs those who have finished its program: After completing the initial DDD training, students can pursue higher education and take classes, work for DDD as an operator, and continue specialized DDD training. Upon graduating from university, they can remain at DDD or apply their skills in different positions.

EMERGING EDUCATIONAL TECHNOLOGY MODELS

The following represent emerging educational technology models. While still limited in number, these examples are illustrative of promising models:

1. Serving as school-in-a-box models

One potentially promising model among educational technology programs is the digital school-in-a-box. While there are numerous variations, the main essence of this model is that users can establish and maintain classes or schools with a standardized technology kit; these kits supply lessons and activities and decrease the overhead costs of establishing, running, and maintaining a school through simplification and standardization. UNICEF sets up Digital Schools in a Box, which are built around a solar-powered laptop with Internet, a projector, a
speaker, a tablet, and a document camera, in schools and health centers in rural areas so children from the most marginalized communities always have access to quality educational content. Each of these digital schools serves about 100 to 200 students and allows students to learn in a collaborative environment at any time. In Kenya, Bridge International Academies utilizes the “Academy in a Box” model, which emphasizes high-quality education through standardization, for its chain of 300 low-cost private schools. Bridge has developed scripted lesson plans and step-by-step instructions available on tablets; these allow less qualified or less experienced teachers to conduct lessons they may typically not be able to and reduce the time teachers spend on non-instructional activities.

2. Giving instant student assessment
The speed and instant nature of technology also allow for on-the-spot student assessment, which many programs use for individually tailored learning for students and immediate access to data for teachers. With Eneza, Education (MPrep), students in remote areas of Kenya can access quizzes and learning tools related to the national curriculum via SMS; they also receive feedback and tips based on their answers. Efiko also utilizes SMS to encourage learning outside of school with curriculum-based tests available on mobile phones. Recognizing the importance of personalized instruction and interactive learning, the developers of Efiko created an app that incorporates topic-based learning, instant scoring and ranking, and social media integration while also helping students develop proficiency in technology.

Teachers can also take advantage of the quick student assessment to adjust instruction to best meet the needs of their students as soon as possible. With Eneza, the students’ quiz results are immediately available to advise and inform both teachers and parents on their students’ strengths and weaknesses. Tangerine also simplifies data collection and analysis of students’ math and reading performance through an open-source, offline application, which allows educators to focus more on students’ performance and results data rather than on the data-collection process.

3. Tracking and monitoring for accountability
Educators and policymakers can also take advantage of the readily available data from these technologies. EduTrac, for example, is an open source application that monitors education service delivery and can be used to collect any type of numerical data via SMS. EduTrac provides districts in Uganda with a tool to facilitate tracking of accountability and helps to improve education policies. Likewise, Visiting Information of Schools Handled with Attendance System (VISHWAS) is an Android-based application reporting system that not only collects data on schools and student performance but also monitors the work of the data collectors themselves in order to help reduce corruption.

CONCLUSION
With the growing prevalence of electronic technology around the world, educational technology programs centered on these devices are becoming increasingly common as well. Some communities, however, still have limited or no access to such technology; many programs target such areas, directly providing technology to increase access to a variety of learning materials. Others focus more on developing or curating the content that can be accessed from these devices. Some programs target teachers in particular, either by using technology to deliver teaching materials and teacher training, or by training them in how to utilize technology. Other programs seek to connect students from around the world to create a global network of learners who can collaborate with a wider community and to foster greater cultural understanding among young people. These students can also take advantage of skills-for-work programs that focus on technology-related skills or train students in ICT-related subjects and aid them in securing employment in the field. Finally, some program types, such as school-in-a-box models, instant student assessment tools, and monitoring and evaluation programs, are not yet as prevalent but are emerging trends in the educational technology field. As the field of innovative educational technology programs expands, evidence on their impact and their ability to improve learning will be important.

For more information on this topic, visit educationinnovations.org or email CEI@r4d.org