Enabling infrastructure

Enabling infrastructure is an important category of scaling and sustaining equitable educational technology, according to the Education Technology (EdTech) Ecosystem Model put forward by the Omidyar Network, now Imaginable Futures. It is defined as the presence of an ICT backbone that supports the distribution and use of educational technology (EdTech) inside and outside of schools. This includes affordable and reliable utilities such as electricity, telecommunications, and broadband internet access available to every school as well as hardware that can be harnessed for administrative and pedagogical purposes.

In order to address the needs of last mile schools, the Department of Education (DepEd) launched the Last Mile Schools Program in July 2019. Last mile is typically used to describe the final leg of service delivery for end-users of telecommunications, electricity, water, and other basic social services, including education. Last Mile Schools as defined by DepEd Memorandum number 59 of 2019 are small schools that are located in geographically distant, disadvantaged, and conflict-affected areas; lack access to basic services such as electricity; and service a majority of indigenous learners. According to DepEd, around 7,144 schools fall into this category. The Last Mile Schools Program articulates a 2-year investment in improving basic facilities and infrastructure; technology provision, including the DepEd Computerization Program (DCP); access to learning materials and training; and ensuring that these schools benefit from programs that are available elsewhere.

### The state of enabling infrastructure for EdTech in the Philippines

The challenge of providing universal electricity and telecommunications service is complicated by the fact that this island nation is located in a particularly volatile region for earthquakes, volcanos and typhoons. Enabling infrastructure is also dependent upon multiple government agencies and the private sector working to service clients beyond just schools. The regulatory environment for ICT development is managed by the Department of Information and Communications Technology (DICT), whose National Broadband Plan aims to develop a core network “infostructure” to connect government agencies, including public schools and hospitals. The Free WiFi for All program aims to bring connectivity to all municipalities and may result in public access WiFi being placed in DepEd facilities in some areas.

Providing computer hardware has been DepEd’s main agenda since 2008 through the nationwide DepEd Computerization Program (DCP). The configuration provided under DCP has evolved over the years, from initial packages of eight stand-alone computers with an internet access point and a printer in secondary schools only. In 2011, DepEd started providing elementary schools with a shared computing setup of one server and six monitors, keyboard and mouse sets, and an interactive whiteboard. From 2012, the interactive whiteboard was removed, and the number of computers increased in secondary schools. In 2019, the configuration for the Last Mile Schools Program was customized to include tablet PCs for elementary schools and laptops for secondary schools, which are easier to transport. By 2022, DepEd aims to have one computer laboratory in every public school.

Schools may benefit from additional resources through the Special Education Fund (SEF) of the local city government. The SEF is a mandatory allocation of the city’s real estate taxes to programs related to education. The city government and local school division officials decide on how the funds will be used, and EdTech investments are popular. Although DepEd is making headway in the provision of ICT resources to public schools, there is wide variation in how those resources are used. Key informants mentioned that despite the availability of EdTech, in many cases the number of teachers who use technology in teaching is still small. The reasons for this include fear of damaging the equipment, lack of knowledge of how to use EdTech, and frequent teacher turnover that undermines the effect of training opportunities. The institutionalization of the Results-Based Performance Management System (RPMS), a nationwide information system that was set up to monitor teacher performance at all levels, may change the incentives for teachers to undertake EdTech use in their classrooms. Under RPMS, a teacher must demonstrate that they are able to “select, develop, organize, and use appropriate teaching and learning resources, including ICT, to address learning goals.”

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3 Department of Education, ICTU summary retrieved from https://en.calaméo.com/read/000/788/4074cef300665
4 The full manual and forms can be downloaded from: https://www.teacherph.com/deped-rpms-ppst-materials/
Private sector participation

There are also notable private-sector initiatives in expanding equitable access to schools; for example, the School Electrification Program of One Meralco Foundation, the corporate foundation of the country’s main electricity service provider. Through this program, the Foundation has electrified 225 schools by providing solar energy, along with one or two laptops, a multimedia projector, and a digital scanner. Internet access is not part of the package, but teachers usually find a way to get access through pocket Wi-Fi devices. According to a study the Foundation conducted among electrified schools (Tarayo, J. Personal communication. October 2019), students were more engaged in learning, teachers were more motivated to use technology and spent more time in school, and the school became the de-facto center of the community.

The Telecommunications company Globe Telecommunications has been helping DepEd in ICT in education since the DepEd Internet Connectivity Program in 2009. After a series of early pilots involving providing internet access and hardware, Globe created the Global Filipino School model: a package of infrastructure, internet access (wireless and wired), teacher training, and community mobilization. After 2 years, they noticed observable differences in school performance. In 2014, they decided to launch the project in a much bigger scale. Global Filipino Schools ran from 2015 to 2018, when Globe funded the establishment of one Global Filipino School in each division of DepEd. Each school was equipped with the latest technology. Globe also gave teacher training on design thinking and 21st century learning. Equipment changed year on year depending on what was available and would be most relevant and appropriate for teaching and learning.

Smart Communications is also actively providing support in EdTech programs for DepEd. From 2004–2011, 652 DepEd schools received devices, connectivity, online content, and teacher training from the company. Following this, investments focused on improving science, technology, engineering, and math education in selected schools. In 2016, the company began to specifically target remote, rural communities to provide, digital learning packages for the purpose of improving teaching and learning in the early grades. Their TechnoCart package includes 20 student tablets, 1 teacher tablet, 1 teacher laptop, 1 pocket Wi-Fi, and 1 digital projector, stored in a pushcart that can be moved from one classroom to another. According to the company’s website, they encourage sponsors who are interested in EdTech to donate a TechnoCart package for PhP 200,000 that also includes teacher training and monitoring and evaluation. Particularly relevant to last mile access is the School-in-a-Bag package, which unlike the TechnoCart, can operate without electricity. The bag contains 1 laptop, 1 LED TV, 5 student tablets, 1 smartphone, 1 pocket Wi-Fi with starter load and pre-loaded digital content, all powered by solar. Like TechnoCart, Smart Communications relies on community partners to deploy these packages to public schools. For example, in May 2019 they partnered with the United Nations Children’s Fund (UNICEF) to provide 50 schools in Western Samar with these packages.

Several entrepreneurs also develop commercial EdTech with schools as their main business. Frontlearners offer a “school-in-a-box” model with content covering the K-12 curriculum that can be accessed offline. The e-classroom solution includes a TV, a Wi-Fi server, a keyboard, and a mouse for the teacher. Content is preloaded and is already aligned to the curriculum and teacher’s guides for easy integration in the classroom. Frontlearners partners with government agencies such as the Department of Science and Technology and local government units to equip public schools. FELTA Multimedia is another private company that proposes a technology package for schools with content focused on STEM education. They propose rugged, portable Studybooks linked to a content distribution system together with Intel Corporation. This is an alternative to the package that DCP chose to use for the hardware and open educational resources (OER) content distribution, but with similar functionality.

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5 Information about the Smart Technocart program can be found at: [https://smart.com.ph/About/learnsmart/programs-projects/smart-technocart](https://smart.com.ph/About/learnsmart/programs-projects/smart-technocart)

6 QBO. (2017). Off to a great start: The Philippine startup ecosystem. A report for QBO and Iida Lipiana & Co. (PwC in the Philippines), Manila: Iida Lipiana. Retrieved from [https://static1.squarespace.com/static/5c987a4d07df37426c00004f15/5c9a9962b4a94bd53a9136d/5c72105037fpcqbo-2017-philippine-startup-survey%3Fsv%3D79%29.pdf](https://static1.squarespace.com/static/5c987a4d07df37426c00004f15/5c9a9962b4a94bd53a9136d/5c72105037fpcqbo-2017-philippine-startup-survey%3Fsv%3D79%29.pdf)
Going the last mile

Given the Philippines' geography, it is not surprising to note that many schools still lack basic facilities such as school buildings, electricity and water. In the Cordillera Administrative Region (CAR), located in the northern part of Luzon Island, the Last Mile Schools Program is a priority of the DepEd regional office and all the divisions within the region. According to regional ICT coordinator Jumar Yagoan, the CAR has one of the greatest numbers of last-mile schools in the country, totaling 1,223. When the program started, the main goal for the region was to prioritize the provision of computers to these schools. The standard DCP packages for last mile schools are 50 tablet PCs for elementary schools and 50 laptops for secondary schools. For schools without electricity, the department is addressing this gap with the School Electrification Project. If the school is an off-grid school with little hope of being connected to the main grid, the DCP has a special package that includes a solar energy system.

In Ilocos Norte, the Schools Division Office is addressing the needs of remote and disadvantaged schools—generally those with large indigenous populations and multi-grade schools—on the grounds that they could benefit from this technology the most. Schools Division Superintendent Vilma Eda introduced the RACHEL (Remote Access Community Hotspot for Education and Learning) system, which is a package of content that can be accessed through a small Raspberry Pi server or using existing laptops as a server. The server stores the digital materials and websites offline and then acts as an intranet for devices at the school level. As of September 2019 the division reported configuring a total of 449 laptops, so each school in the division had one to two laptops on which RACHEL was already installed. Teachers also opted to install RACHEL on their personal laptops and use their own devices for their classes. With RACHEL, teachers had access to international open education resources such as those from Khan Academy, classical literature, textbooks, Knowledge Channel Foundation, Inc. videos, and other reference materials offline. The division also added locally made, contextualized instructional materials for elementary teachers using mother tongues. “Prior to RACHEL, it was very hard to get learning materials. Now, you can easily access RACHEL and get your own materials,” said one teacher about the program.

“As we know, not all students read or write at the same pace. Having the material on your device allows you to read and reread the text as long and as many times as you want. This is a way to customize learning for the students.”

Insights, analysis, and recommendations

Philippine schools are in a situation with considerable sources of infrastructure; schools may wait for DCP to arrive, source directly from a commercial provider, or negotiate with local governments and private sector partners. Yet DepEd remains the largest provider of ICT equipment in the country with the most control over equitable access to technology. Given the amount of resources allocated to the DCP and as they approach scale, DepEd should carefully assess the program in terms of impact rather than reach. Widespread access to technology is only one element of scaling equitable access to technology, as the Omidyar Network’s EdTech Ecosystem Change Model makes clear. Schools need to be equipped to use this technology appropriately and maintain it in good condition. The DCP should carefully consider all training and technical support needs and how to deliver these through a range of means and stakeholders.

Given the variety of technology models that are potentially available, it could be useful for schools to have a decision tree that helps them choose the right model for their context—when a choice is possible. Open discussion and knowledge sharing among suppliers of what their solutions are combined with objective information on total costs of ownership and impact will help schools make effective use of EdTech. Presently, there are no systematic studies of how DCP recipient schools made use of the technology and what impact it has had on teaching and learning. Some private sector partners have conducted evaluations of the programs, which can serve as useful models for research design, or DepEd can outsource evaluation to third parties.

In terms of last-mile access for schools through basic infrastructure, DepEd is not alone; they are dependent upon other government agencies and private sector partners with their own incentives and objectives. Therefore, collaboration with others will be critical and mutually beneficial. The needs and recommendations in this brief are relevant for all schools, but the characteristics that prevent Last Mile Schools from having infrastructure mean they most likely also have other challenges that impact teaching and learning, such as recruiting and retaining quality teachers and leadership, multilingual barriers and a lack of textbooks and other teaching resources. Therefore, it is even more important that hardware and infrastructure are deployed in packages that include training and sustained support from a range of stakeholders.

This topic brief is based on information from interviews with officials and staff of DepEd regional and division offices in the Cordillera Administrative Region and Baguio City, the Department of Information and Communications Technology, the Department of Science and Technology-Science Education Institute, the United Nations Development Programme Philippines office, two private telecommunications companies (Globe Telecommunications and Smart Communications), two private EdTech service providers, and two non-profit organizations working in EdTech. Relevant policy documents were also reviewed. This brief was prepared by Liezl F. Dunuan, under a subcontract issued to the Foundation for Information Technology in Education (FIT-Ed), Philippines. It was edited by Sarah Pouzezavara (RTI) prior to publication.” (2 April 2020).