



Digital Technologies: A Path to Improved Education and Health in Remote Communities

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As the use of personal computers became common, and education and health care seemed increasingly dependent on digital technologies, escalating alarms were heard about the prospect of a “digital divide.” The divide, it was feared, would compound existing technological backwardness and leave poorer countries, communities, and families further and further behind.

And the fact is that a digital divide has emerged. Many people—particularly in lower income countries and communities—have limited or no access to the new technologies. They lack both the resources to acquire the new information technologies and the education to effectively use it. Computer use is highly correlated with income and education; the poorest and least educated make far less use of the technology. Upwards of one-third of Uruguayans had access to the internet in 2010, compared to little more than one percent of Salvadorans.¹ Roughly eight out of ten young Brazilians in the top quintile of income have internet at home, contrasting to only 10 percent of the bottom fifth.²

Across the globe, including in Latin America and the Caribbean, governments have sought ways to overcome the digital divide and make computer technology more accessible to poor families and communities. Even more, increasing efforts are being dedicated to taking advantage of the technology to improve services to low income groups in such areas as health and education. A variety of programs—successful and not—suggest that such services can make an important difference. In Ecuador and Panama, access to internet in school has been shown to compensate, at least partially, for the lack of internet at home.³ Brazil’s national telemedicine programs help bring health services to small, remote cities.⁴ Telemedicine technology is at work in remote communities in Panama.⁵

Efforts, however, are often launched with great enthusiasm and at considerable cost—but without systematic planning and preparation. The objectives are left vague, necessary complementary inputs are ignored, and specialized training is neglected. Many education programs, for example, do not set out even the most basic goals such as coverage, retention, or improved learning.⁶ In some countries, teachers were not trained to make use of classroom computers.⁷ Digital health initiatives in rural communities have often lacked reliable internet connectivity.⁸

The direct and indirect expenses associated with the introduction of new technologies—the infrastructure costs, recurring expenses for technical assistance and training, and expenditures for equipment maintenance and replacement—are routinely underestimated by large amounts. The initial investment for Uruguay’s personal laptop program represented 17 percent of Uruguay’s annual budget for primary education.⁹ And recurrent costs are higher than anticipated as well.

Moreover, outcomes are rarely evaluated or compared to other approaches to improving the quality and accessibility of health care, education, or other services. And where they are evaluated the results are not often used to reform or improve programs. A recent report of the Inter-American Development Bank concludes that neither governments, non-governmental agencies, or multilateral agencies have produced systematic empirical evaluations on digital technology projects.¹⁰ In the World Health Organization’s 2010 global survey, only three Latin American countries reported having done national evaluations of health-at-a-distance projects.¹¹

What Can Digital Technologies Do?

Despite the many challenges involved, digital technologies have the capacity to bring services to individuals, families and communities which would otherwise remain fully excluded or have only limited access to mostly poor quality services. Remote, isolated rural communities should be an important target for programs and services that can make effective use of digital technologies.

Residents of these communities are among the poorest and most vulnerable citizens in Latin America. More often than not, their living conditions are precarious. Jobs are scarce and low-paying. Public services—from roads to law enforcement to health and education—are notoriously poor, or simply non-existent. Rates of illiteracy, poor health, and infant mortality afflict these communities at much higher rates than those in more urban and accessible areas. They are the places where governments are finding it especially difficult to meet the Millennium Challenge Goals. Moreover, these communities and their residents are often only weakly integrated into national life. Their political participation is limited. They have only a tenuous understanding of their rights and obligations, and live with limited expectations of access to national systems of justice or police protection. Often, they have gained little from prospering national economies or expanding social programs.

It is, however, by no means clear or certain what contribution digital technologies can make to such communities and their residents. These technologies may allow for the provision of new services to the communities, which would otherwise be too costly or too complicated to deliver. They may be able to improve the quality of existing services, and in some cases, might be able to substitute, at least partially, for human skills and resources that are in short supply. But governments need to make a special effort to find out whether and how digital technologies can be used to improve service delivery in remote locations.

This paper will focus on health and education services—asking the question “what can and should Latin American governments do to take advantage of digital technologies to expand and upgrade the provision of these services to remote, rural communities, and to integrate the communities and their residents more firmly into national society?” What needs to be done to determine whether and how computer technologies can help alleviate the deep poverty and isolation of many rural communities, and increase their limited ties to the broad economic, political, and cultural life of the nation?

The cost of installing, maintaining, and effectively using the technologies will, of course, be crucial considerations. We will also be interested in what mechanisms are available for financing these costs. Are there private resources that could supplement public investments? Local

businesses in some area may be prepared to share costs if they see the promise of more reliable electricity or new access to the internet. In some remote areas, large mining, energy, and agricultural companies have made extensive capital investments and may want to build good will in local communities by helping to expand health services and education opportunities; they themselves could also benefit from these services by having better trained and healthier workers.

Some Early Lessons

Although the experience with digital technologies for distance learning and remote health provision is still limited, and there has not been much in the way of analysis of the costs and benefits, one clear lesson appears to be emerging. Access to new technologies, by itself, will not accomplish much. An integrated approach is essential; the technologies, in order to be useful, have to be complemented by necessary infrastructure and qualified human resources. It is obvious that computers distributed in communities that have no electricity cannot contribute much. It may be less obvious that, without sufficient prior training, local school teachers may be reluctant to use computers for classroom instruction or that teachers may need continuing access to technical support. Health workers may also need considerable training on computers and be better prepared in order to communicate effectively with doctors at a distance. Technology, in short, cannot work on its own.

Some other emerging lessons include:

- The costs of effectively introducing a new technology will almost always be greater than anticipated. The challenge for governments is to make sure that they are making the best use of scarce resources to bring health and educational services to a poor community and integrate the community into national life. It is critical to identify and to take account of full costs of installing, maintaining, and using the new technology. Acquiring computers may be the least expensive part of bringing digital technology to a community. A reliable source of electricity must be available. Ready access to the internet is required. Qualified people are needed to install the technology, show teachers and health providers how to take full advantage of it, help them solve the myriad problems associated with computer

and internet use, and to repair damaged hardware and software. Teachers and health providers will need initial training and refresher courses. The technology will need to be repaired, upgraded, and replaced over time. The computers themselves are a minor part of the total cost involved.

- The full gains of the new digital technology cannot be achieved quickly. Teachers, students, health workers, and patients all need to learn about and gain experience with the technology, become comfortable with it, and know its possibilities and limitations. There is an important learning period that cannot be rushed. What is crucial is that providers and others do not lose confidence in the technology or become frustrated during the period of learning and adaptation. And there will almost always be some number of technology “resisters,” who will remain forever skeptical about the benefits, and often blame the technology for unrelated failures, yet they have to be accommodated not alienated. Everyone will likely get better at working with technology over time. It should become as natural a part of the classroom as a blackboard, or of the clinic as the X-ray machine, if the training and infrastructure is appropriate.
- It is critical always to remember that the objective is not the introduction and utilization of digital technology. The technology is a means to achieve better teaching and learning, to improve health care, to overcome isolation and poverty. Whatever school, clinic, or community that adopts new technology will have to adjust to it, no question. But the technology should also be adjusted and adapted to the needs of the institutions and communities into which it is introduced. The technology should be used flexibly, in ways that the users can take best advantage of it.

Recommendations and Conclusions

1. Our basic conclusion is that there is no definitive evidence yet that the new digital technologies provide a cost-effective way of delivering educational and health services to remote communities. Most experiences to date have not been planned or managed in a careful, deliberate way—nor has data been systematically collected and

analyzed on the costs, results, and wider impacts of technology projects. At the same time, however, enough anecdotal evidence is available to suggest that the technologies may, in fact, offer real and sustainable benefits.

2. Accordingly, it is recommended that virtually every country in the Americas should take up the challenge of exploring whether and how to take advantage of the new technologies. This is not to argue that governments should make substantial investments immediately. It means that they should study carefully what investments make sense and how they should go about deciding on them. Indeed, governments should be very cautious about making large expenditures. They need to get advice and technical assistance from top rank specialists and from people who are knowledgeable about the communities that might be selected as beneficiaries. They also need to be as clear as possible about the objectives to be pursued and about the total costs and corollary investments that will be needed.
3. Ideally, each nation would create its own expert team or teams to assess the potential for the new digital technologies. The teams obviously have to incorporate specialists in the relevant technologies, but they should not turn only to those that are fervent advocates of digital approaches. Just as important, they will need to include experts who know the challenges involved in delivering education and health care to remote communities—and what is needed to address them. In many places, there will also be a need for attention to the culture and politics of the communities before reaching any recommendations. Many countries already have high quality teams in place, and they could be helpful to others that have only incipient capacities. But no country should proceed without appropriately trained and prepared experts who can assess the viability of projects and advise national governments and local communities on how to proceed. Large investments are required for introducing digital technologies, and they can be easily wasted if not planned and implemented intelligently.
4. It is important that investments in technology are not automatically seen as positive and useful. Ideally, governments might start by trying to develop practical national

goals for using technology to reach remote communities and upgrade their education and health services. Regardless of how ambitious a country or government is, it is critical to start with pilot programs. That is the only way to gain experience, learn first-hand what can go wrong, and begin to accurately test the value of the technology and what it is likely to cost.

5. It is also important that a careful systematic study be done in each community (or in a small group of neighboring communities) in which an investment in digital technology is contemplated. Clear, attainable objectives need to be established—for example, the number of people who might be served and/or the level of improved quality of teaching and learning that is anticipated—and means developed for measuring actual outcomes. Careful estimates of immediate and longer term costs need to be calculated, including for repair, replacement, and upgrading the technologies—and sources of financing should be clear.
6. Because the programs are new and experience is short, two things are imperative. First, the programs need to be regularly evaluated. How many new people are being reached? Is the quality of health care or of schooling improving? Are children doing better on tests? How are teachers and parents reacting? Are the costs being controlled in ways that are consistent with plans? Second, there needs to be considerable flexibility to adjust the technology to the specific needs of the community. At the outset, things are not likely to go as well as hoped or anticipated. There needs to be room for change and adaptation.
7. Evaluations done in each community need to be aggregated, and the entire national effort to promote digital technology assessed. Are the digital technologies performing as expected or have unanticipated problems emerged? Are the gains commensurate with the costs? Is student performance improving? What about health standards? Are the investments sufficient or excessive? Are the same problems emerging in community after community? If not, what explains differing outcomes? The results of these assessments should be share widely among countries.

8. Financing should be a concern from the start. Initial investments will be substantial to pay for the purchase of computers and related devices; the building of necessary infrastructure, including electrical capacity and access to the internet; the training of teachers and medical workers; and hiring specialized consultants. And initial investments will need to be complemented with funding for continuing costs of specialists, equipment repair and replacement, web access, and other items. In the case of many rural communities, the federal government will be the only source of capital to pay for these costs, but in some places local businesses that may benefit from the infrastructure—electricity, internet access, improved training for local graduates—could be contributors. At times oil or forestry companies may be located close to one or more communities, and would be willing to contribute to costs.

9. While each country will need to develop its own capacity, Latin America and the Caribbean should also develop a regional expertise regarding digital technologies and their applications in health and education. The regional center would be a place that would serve as a clearing house for information on new and upgraded technologies, a source of high-level expertise for individual countries, a central location for reports and evaluation on national experiences, and a setting where coordination and exchanges among countries can take place. PAHO is the logical place to build a regional expertise on health and technology. Its work in developing eHealth in the Americas is already very well regarded, but probably needs to be expanded and diversified. A similar regional center for digital education should be developed—perhaps at the Inter-American Development Bank or the CAF Bank for Latin American Development. The OAS education division might also be a candidate to take this on.

10. The idea, ultimately, is not simply to make new technologies available. Success cannot be measured by number of communities, schools, or students that have computer technology—or number of local clinics with digital hookups to hospitals. The end product needs to be improved health and education for more people. Technology cannot displace teachers, doctors, and other providers. It can only complement them.

¹ <http://www.eduinitiative.net/2011/04/one-to-one-laptop-programs-in-latin.html>

² CEPAL. Documento de Proyecto. “Avances y desafíos de la Sociedad de la Información en América Latina y el Caribe 2008-2010”. Mar 2010.

³ Avances en Access: 2008-2010, CEPAL).

⁴ IDB Book pp 159

⁵ CEPAL pp. 106-108

⁶ CEPAL Series 171 pg 32

⁷ CEPAL Series 171 pg 48

⁸ Challenges to Basic Telemedicine: ISP and Radio Regulatory Problems. Cone, Leon, Hummel, Merrell.

⁹ IDB. Development Connections: Computers in Schools. Pg 180

¹⁰ IDB Book pp 4-5

¹¹ WHO 2010 Atlas