

# Appropriate information-communications technologies for developing countries

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Many of the solutions to global health problems exist, but are not applied. This is called the “know–do” gap: the gap between what is known and what is done in practice.<sup>1</sup> However, it is not enough that “someone, somewhere” knows about best practices; it is also essential that the very people who are dealing with health problems know what to do. Ironically, regions of the world with the least resources for solving health problems often have the least access to needed health information.

For many in the well-connected world, the first response to a need for information is to search the Internet. We expect that the world’s health information is just a few keystrokes away. Many health-related organizations work to disseminate information to the world through comprehensive and attractive websites where information can be easily and quickly accessed. Regrettably, this “come and get it” approach to the dissemination of health information often fails to serve the needs of the “information-poor” in developing countries. Only one-sixth of the world’s population uses the Internet.<sup>2</sup>

A recent World Bank report provides estimated numbers of Internet users per 1000 inhabitants, along with average costs of Internet connections, in the countries in sub-Saharan Africa.<sup>3</sup> The costs of Internet connectivity in Africa can be hundreds of times higher than those in Europe or the United States of America. For “free” information on the Internet, institutions in developing countries must often buy larger-capacity connections than they can realistically afford. For example, some universities in Africa are spending as much as the equivalent of 20 full-time faculty salaries for a 2-megabit Internet connection that is then distributed to 500 to 600 computers, resulting in a costly and painfully slow connection for everyone.

Even where institutions and individuals have Internet access, the connection often has little practical value for more than a few elite users. Our tests of actual Internet speeds indicate that, while users at large European or American universities enjoy Internet connections which deliver 17 million bits per second, users at African institutions operate at speeds that are 500 to 600 times slower (~30 thousand bits per second). We also routinely test hundreds of Internet servers at African institutions and find that the typical server is online only about six hours per day and has frequent disconnects lasting days or weeks. As a result, it is impractical for instructors at these institutions to require students to discover information on the Internet. Also, these instructors rarely use resources like video, audio and multimedia tutorials because downloading these items is expensive, slow and unreliable.

Some may dismiss the current conditions as temporary, expressing confidence that “the Internet is coming.” Although the number of Internet users worldwide grew by 2000% between 1996 and 2006,<sup>2</sup> the number of users in the next four years is projected to rise from the current 1.1 billion to 1.6 billion, representing growth from 16.7% to only 23.3% of the world’s population.<sup>2,4</sup>

Given all these circumstances, it seems wise to focus on technologies that work under current conditions, that make the best use of limited resources, and that can have immediate impacts where health information is most urgently needed. We offer two examples that are part of the Global Health Campus Initiative being developed by the University of Iowa, WHO and other partner organizations.

The *eGranary Digital Library* utilizes a common hard drive to store and deliver over 700 CDs worth of Web

pages and other digital educational resources (<http://www.eGranary.org>). This “Internet in a box” requires no external connection and provides users with the look and feel of the Internet, including a powerful search engine. The WiderNet Project currently has over 130 eGranary Digital Libraries installed at institutions throughout Africa and Bangladesh, Haiti and India (<http://www.widernet.org>). Many of these devices are working over local area networks that are extremely fast and virtually free – capable of serving thousands of simultaneous information-seekers at speeds many times faster than even the best universities in developed countries.

By providing users with a wealth of information in an on-site digital library, institutions can purchase the minimum bandwidth needed to meet other needs. They might, for example, utilize a real-time web-conferencing program that is optimized for very slow Internet connections to deliver live lectures, multi-site collaborations, patient consultations and case studies (<http://globalcampus.uiowa.edu>). The Global Health Campus Initiative is using such a system to connect to more than 50 developing countries to serve as the basis for developing shared curricula and for workforce capacity-building; a concrete use of appropriate technology to bridge the know–do gap. ■

## References

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