From Digital Divide to Digital Dividend: What Will It Take?

by John Daniel and Paul West

One of the greatest challenges in higher education is to give billions of impoverished people access to it across the globe. The growth of information and communications technologies (ICTs) over the past decade holds great promise for meeting this challenge, yet the limited access that most of the world's population still has to such technologies constitutes its own challenge as well. Can we connect technology to learning and training for the benefit of these populations?

It is our belief that the digital divide that currently exists can give way to the digital dividends that such technologies offer for educational improvement in a global context. The key is for providers of postsecondary education to combine connectivity and shared courseware into a new business model that massively increases access to education. National governments and educational institutions can adopt many strategies to foster such a model and vastly improve the lives of people worldwide, particularly in developing countries.

In this article, we outline the important steps that such entities can take and have already taken to maximize the digital dividends that ICTs provide for populations across the digital divide. While our emphasis is on postsecondary education rather than primary or secondary education, some of the recommendations offered here have implications for the long-term development of these other educational sectors as well.

Educating the Developing World

In developing countries, the challenge begins with demography. Rapidly growing populations are not being served with adequate educational opportunities. For example, UNESCO (2005) reports that while 40-50% gross enrollment ratios (GERs) in tertiary education have become the norm in the developed countries of North America and Western Europe, tertiary GERs remain below 15% for India and China and below 5% for developing countries in sub-Saharan Africa and elsewhere; UNESCO calculates the median tertiary GER at 55% for developed countries and 11% for developing countries.

The issue of access to education is linked to the wider challenge of improving the quality of life of the world's poorest people. In addressing this challenge, C. K. Prahalad and Stuart L. Hart have researched how corporations can better serve those at the bottom of the world economic pyramid (Prahalad 2005; Prahalad and Hart 2002). They draw attention to the four billion poor people in the world who aspire to better lives, and they urge corporations to look at their globalization strategies through a new lens of inclusive capitalism since "for companies with the resources and persistence to compete at the bottom of the world economic pyramid, the prospective rewards include growth, profits, and incalculable contributions to humankind" (Prahalad and Hart 2002, ¶ 5).

What would be the implications of extending higher education to these four billion people? A postsecondary education age participation rate of 35% within this group would yield 150 million additional postsecondary students, far more than total current enrollments worldwide. Educational institutions would therefore face the same challenges as businesses in serving these people. Prahalad and Hart (2002) argue that cultivating new consumer markets in poorer nations would require "radical innovations in technology and business models" that include changing from the ideal of "bigger is better" to "an ideal of highly distributed small-scale operations married to world-scale capabilities," thereby "helping people improve their lives by producing and distributing products and services in culturally sensitive, environmentally sustainable, and economically profitable ways" (¶ 7-8). The same principles would certainly apply to the development of learning and training opportunities in these settings; rather than relying upon a centralized growth model based on higher

prices and higher profit margins from a smaller consumer base, providers of postsecondary learning would rely upon a distributed growth model that would entail lower prices and lower profit margins across a much larger, culturally diverse consumer base.

Signs indicate that expanding higher education through ICTs and online provision is a global trend (Uvaliæ-Trumbiæ and Varoglu 2003). Developing countries such as Tanzania, Kenya, Nigeria, and Iran see it as a way to meet growing demand while reducing the brain drain. Others follow South Korea in viewing the Internet as a motor for economic development. Some governments and international organizations link online learning to the development agenda, as in the cyber universities in South Korea, the Nigerian University Network, and other virtual university initiatives such as the Virtual University for Small States of the Commonwealth.

Meanwhile, new providers of postsecondary education are proliferating as well, and they include new campuses of existing institutions, IT companies delivering courses and certificates, for-profit providers, and corporate universities. Some of these providers operate across national borders, usually by offering online courses to students in remote settings. However, Daniel, Kanwar, and Uvaliæ-Trumbiæ (2005) find that cross-border postsecondary education is, for the moment at least, a negligible phenomenon in developing countries. As a result, developing countries must rely mainly on home-grown solutions to expand postsecondary education. In what follows, we address the ways in which these countries can develop online learning in such a way that key variables of capacity, quality, and cost are reconfigured for the needs of their populations.

Open Educational Resources: Digital Dividends for the Developing World

The most promising innovation in higher education is the concept—and the developing reality—of open educational resources (OERs). The term refers to open course content as well as open source software and tools. Essentially OERs apply to teaching and learning the basic principle that underpins academic research: sharing. Distance educators have talked for years about sharing courseware, but the obstacles to such practice have also prevented its rapid growth in online learning. One obstacle has been the "not-invented-here" syndrome that still characterizes many academic institutions. Another obstacle has been the challenge of developing consistent standards for open source course management software as well as for the classification and design of digital learning objects for convenient reuse by different parties. Courseware exchange has also been limited by copyright concerns and the sheer difficulty of sharing and adapting learning materials that are not in digital formats.

However, because of such developments as Carnegie Mellon's Open Learning Initiative and the Open University's Open Content Initiative, the standards for learning management systems established by the Sharable Content Object Reference Model (SCORM), and the standards for learning object classification established by the IEEE, much progress has been made towards making OERs a widespread attribute of online learning. Open course content provided by such projects as MERLOT or the Massachusetts Institute of Technology's OpenCourseWare program makes it possible to share and adapt courseware on a more equal basis. Just as researchers can build upon the published work of other researchers, sites such as The Development Gateway allow instructional designers to build upon the learning objects developed by their predecessors for reuse in new learning contexts. If providers of postsecondary education can successfully combine connectivity and shared courseware into a new business model, they could massively increase access.

Implementing Open Educational Resources: The Four A's

As argued by Susan D'Antoni (2002), potential learners should ask four questions about the usefulness of online learning; these same questions should also guide the use of OERs to foster online learning opportunities for developing nations.

Is it accessible?

For online learning to have any impact, it must be accessible to the learner. In extending online learning to developing countries, the first priority is to provide ready Internet connectivity. The second imperative is to make OERs more accessible and to expand their numbers.

The Commonwealth of Learning (COL) has tackled the problem of accessing multiple learning object repositories (LORs) when connectivity is poor and surfing from one LOR to another is time-consuming. The software adopted by COL is a combination of eduSource Repository-In-a-Box (eRIB), a product of Canada's CANARIE e-learning project, and pakXchange, an open source product from the private sector. The outcome is free open source software with database and security features that enable the creation of multiple libraries of learning content, multiple contributing institutions, and multi-level security, which can be downloaded from the COL Web page.

Is it appropriate?

Once e-learning is accessible, does the content fit learners' needs, and does it respect their cultural context? Few subjects and delivery methods are universally appropriate. However, because OERs allow learning materials to be made appropriate by local adaptation, they offer a vital means of addressing this need for online learning programs in developing nations.

Is it accredited?

In cross-border online learning, accreditation is a key concern. Accreditation in the country of origin is one indicator of quality and provides some consumer protection; however, learners' own countries must recognize the credential for it to be useful. It is important to promote trust and confidence in postsecondary online learning at the international level and to develop quality assurance between providers and regulators while empowering learners to assess the quality of online learning, particularly for cross-border provision (Moses 2004).

The UNESCO-OECD guidelines on quality provision in cross-border higher education are an encouraging step forward because they promote mutual trust and international cooperation in quality assurance as well as the recognition of qualifications. They also provide a helpful set of criteria for designers as they select and modify OERs for online learning programs that serve developing nations.

Is it affordable?

If the opportunities online learning offers are not affordable in local contexts, we shall not see the digital dividend replace the digital divide. Because of their digital format and nonproprietary nature, OERs do have the potential to make a difference in developing nations (cf. Keats 2003). It all depends on whether the current enthusiasm for OERs is sustained between both providers and users and whether the two groups quickly merge into an OER community of mutual give-and-take.

Infrastructure and Policy Issues

If open course content and open source software tools offer vital building blocks for online learning initiatives in developing nations, their potential will also only be realized when the infrastructure and policy frameworks exist to support widespread implementation of online learning.

Make Good Internet Bandwidth Affordable

Failed projects like the United Kingdom's e-Universities venture suggest that governments and their agencies should not operate online learning programs except for governmental functions like offering instruction about

the Highway Code. Rather than directly creating or managing online learning programs, the role of governments is to create the context in which online learning can flourish. This is a particularly crucial task in developing countries where the context for online learning is usually unfavorable.

The central barrier to online learning is limited bandwidth due to telecommunications legislation and telecom company monopolies. Because the overwhelming majority of Internet service providers and leased line connections are located within OECD nations, developing nations rely too heavily on foreign Internet backbone providers for full access to networks, which in turn results in much higher connection costs for individuals and institutions (Association for Progressive Communications, n.d.). Citizens of OECD countries represent 14% of the world's population and make up 79% of Internet users across the globe; meanwhile, the cost of monthly Internet access for individuals in developing nations may often be well over 100 times the same cost for an individual in the United States (United Nations Development Programme 2001).

Making good Internet bandwidth affordable to institutions is an absolute necessity for any country aspiring to quality postsecondary education. Governments should ensure that their telecom suppliers provide it. As a further strategy, institutions can join together to buy bandwidth in bulk and thereby reduce the price. In South Africa, for example, a small nonprofit entity, Tertiary Education Network (TENET), buys bandwidth for nearly 50 institutions at once. To gain this kind of negotiating power, institutional leaders and IT departments must cooperate.

Make Effective Use of Bandwidth

There is never enough bandwidth, and solving the problems of limited bandwidth will take time. Meanwhile, institutional managers should have policies for using bandwidth sensibly by defining acceptable use. These should cover the kinds of data that may be transferred to and from the institution and the types of Web sites that may be visited.

Such policies are an essential stepping stone to technical strategies that maximize the benefits of bandwidth, both by day and by night. To guarantee bandwidth during the day for research and study, management must focus on those functions and avoid usage for which there are alternatives. Demand for bandwidth is usually very low at night, and so it can be used for other tasks.

Learners in developing countries do not usually have computers or Internet connections at home. They go instead to Internet kiosks or cafés where access is expensive in terms of local salaries. However, given the low Internet speeds available, students are unlikely to connect for long enough to gain much information. Institutions therefore should provide Internet access on campuses over extended hours from early morning until late at night.

Address Non-Technical Issues in Developing Online Learning

In 2003 UNESCO's International Institute for Educational Planning (IIEP) conducted a series of case studies on the creation of virtual universities on six continents. They highlighted four issues that become particularly sensitive as institutions develop policies on open educational resources.

1) Institutional development and organization

Face-to-face teaching institutions may find it difficult to develop general policy on online learning. Since their existing policies and procedures were conceived for a different learning environment, such institutions will need to establish new frameworks for the effective implementation of online learning. Institutions that support distance teaching may already have a general policy framework that is appropriate for online learning, but even in these cases, they may find developing policy for OERs a serious challenge.

2) Academic issues

It is important for educational institutions to offer the right programs. A feasibility study may help to identify subjects that are in demand and for which online learning is appropriate.

Online learning is often touted as student-centered. To make this true requires careful planning of student services and student aid. Some services will need to be available continuously (24/7). Moreover, institutions in developing countries will need study centers.

3) National and international environment

The high cost of developing online learning argues for the implementation of national and international partnerships and cooperation in its production and provision. This is what motivated the ministers of education of the Small States of the Commonwealth to call for the creation of a virtual university as a framework in which they could work together to create courses and programs, thus avoiding total dependence on larger states.

4) Management

Among the challenges for management is one hot issue: proprietary or open source? This is a strategic question that is at the heart of management's core function of getting the best results with the available resources. The recent announcement by Australia's Northern Territory Government that it had been able to put 1,000 more terminals in schools by saving $1 million through a move to open source software shows that significant sums are at stake. Institutions in developing countries do not have money to burn.

Managers must overcome their reluctance to challenge their technical specialists and engage with the issue in a systematic way. While we have advocated OERs above, we recognize that it is not appropriate to prescribe choices arbitrarily between open source and proprietary software for all situations; each institutional situation must be reviewed on its own merits.

When considering decisions such as open source vs. proprietary software, educational institutions should consider the following:

- IT departments should have standard procedures in place for making decisions about acquiring hardware and software. Senior management's task is to ensure that these procedures avoid suboptimal choices by taking the bigger institutional picture into account. For example, COL has developed a decision-making aid for acquiring a learning management system. Determining which learning management system an institution should choose is not COL's role, but this tool can be used by a management team to work through the decision in a systematic way.
- Managers must undertake such decisions with a long-term perspective, looking beyond the present window of a particular offer for a special license fee.
- The IT people must be able to assess what functions can be performed with open source software and be aware that not all open source software is available free of charge. However, the term open source does mean that the programming code is available to institutions, which can usually make contributions and improvements to it.
- Institutions need to balance the merits of specialization with cross-training so that IT staff can work competently in both Linux and Windows environments. There are quite a few competent trainers in Africa; COL can help match needs to people. Having cross-trained IT staff is the best way of ensuring that an institution gets the best out of both proprietary and open source solutions.
- Remember that including Linux in an organization does not mean having to change everyone's computer. The server room is likely to be the first place for free open source software applications to appear. Money saved by using a free product can be applied to applications where a free product is not an alternative.
- Teaching institutions should aim for variety and specialization in setting up computer labs. Teaching a particular application (e.g., Lotus) requires the systems for that task, but teaching generic concepts and

skills, such as word processing, spreadsheets, and presentations, can utilize free systems like Linux and Open Office and thereby save thousands of dollars in license fees.

- It is particularly important to encourage students in developing countries to write code for open source software so that they can join the worldwide community of code writers. COL would be very pleased to hear from universities who are willing to have students contribute to the program code of our Learning Object Repository, COL-LOR (eRIB/pakXchange) by creating features that can benefit everyone. This open source LOR, which can link a network of LORs together, was made possible by Canada's CANARIE program of support to e-learning.

Conclusion

We encourage educators and governments worldwide to harness their energies to the challenges of transforming the digital divide into a digital dividend for the developing world. There is enormous pent-up intellectual creativity among the billions of poor people in the world. Sadly, most existing means of learning and training have been too expensive and too inflexible to respond to their needs. Our aim must be to combine connectivity with learning resources in order to create a global intellectual commons accessible to the whole of humankind.

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References

Association for Progressive Communications. n.d. Internet economics: What things cost (in different countries) and who pays. http://rights.apc.org/handbook/ICT_03.shtml (accessed May 18, 2006).

Daniel, J. S., A. Kanwar, and S. Uvaliæ-Trumbiæ. 2005. Who's afraid of cross-border education? A developing world perspective. Paper presented at the INQAAHE 2005 Conference, Wellington, New Zealand, April. http://www.col.org/speeches/JD_0504INQAAHE.htm (accessed May 18, 2006).

D'Antoni, S. 2002. Bridging the digital divide: Can online learning help? Paper presented at the 7th Annual GATE Conference, Paris, September.

Keats, D. 2003. Knowledge Environment for Web-based Learning (KEWL): An open source learning management system suited for the developing world. *The Technology Source*, January/February. http://technologysource.org/article/knowledge_environment_for_webbased_learning_(kewl)/ (accessed May 18, 2006).

Moses, I. 2004. Perspectives on globalization, internationalization and quality assurance. http://www.ia-up.org/Beijing%20Women%20Presidents%20-%20Opening%20Ceremony.doc (accessed May 18, 2006).

Prahalad, C. K. 2005. *The fortune at the bottom of the pyramid: Eradicating poverty through profits*. Upper Saddle River, NJ: Wharton School Publishing.

Prahalad, C. K., and S. Hart. 2002. The fortune at the bottom of the pyramid. *Stategy+Business* 26. http://www.changemakers.net/library/temp/fortunepyramid.cfm (accessed May 18, 2006).

United Nations Development Programme. 2001. *Human development report 2001: Making new technologies work for human development*. New York: Oxford University Press. http://hdr.undp.org/reports/global/2001/en/default.cfm (accessed May 18, 2006).

Uvaliæ-Trumbiæ, S., and Z. Varoglu. 2003. *Survey of the 2002 breaking news and the UNESCO global forum on quality assurance, accreditation, and the recognition of qualifications*. London: The Observatory on Borderless Higher Education (OBHE).

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