Distance Learning in Developing Countries:
Is Anyone Measuring Cost-Benefits?

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Distance Learning is becoming a major issue in education and in strategic planning for regional development. To the college administrator it is a possible source of an entirely new model for deploying resources for students. For businesses it is both a way of changing the traditional methods used to teach skills and a possible new source of profitability. For multinational organizations like the United Nations Development Programme (UNDP) or the World Bank, Distance Learning may have the potential to deliver the precious resource of knowledge to some of the most destitute countries of the earth, while at the same time stimulating the growth of fledgling telcom infrastructures. This article takes a brief, sober look at Distance Learning in the context of developing countries. Distance Learning is a significant topic in Information and Communications Technology (ICT) discussions because it is both a medium and a metaphor. As a medium, it promises to deliver knowledge to the poorest countries and as a metaphor it connotes the harnessing of many ICT capabilities in a noble cause—what Alfred Bork calls "a new learning paradigm."[1] For those who view education as the most important priority for the world's poorest countries, Distance Learning is perhaps the most significant method for accomplishing a miraculous, leapfrogging transformation.

Even in the continent of Africa, which, by any standard, is among the world's poorest regions in ICT and especially Internet deployment, there are scores of significant attempts to implement Distance Learning. The Japan International Cooperation Agency (JICA), a significant donor in developing countries, sponsored a study of Distance Learning in Africa last year and found an abundance of Distance Learning programs being initiated and managed, even in some of the world's most destitute countries.[2] These programs use all the technologies that are normally associated with Distance Learning: correspondence courses, radio, television, telephone, Internet, telecenters, CDROM and satellite broadcasting. Similar efforts are underway in developing countries in Asia, and in South and Central America.

Determining the Value of Distance Learning: Too Difficult?

Despite the proliferation of Distance Learning applications worldwide, there has been a problem in comparing results of technology-assisted instruction with traditional methods, even in the most developed countries. A recent conference sponsored by the Andrew W. Mellon Foundation featured almost two dozen papers by researchers at US universities who had developed new approaches to Distance Learning –in individual courses, like Calculus, Physics, English Composition, Biology, Statistics and many others—and in complete academic programs like the MBA.[3] While each course was well planned and apparently very popular with students, it was not certain whether there was any significant difference between the special treatment and the traditional delivery methods. Did the students really learn more? If so, was it because they preferred the convenience of the Distance Learning process? Did the Internet-based graphics attract the interest of these technologically literate college students? Was there an improvement in retention of the material presented? Issues like these are at the heart of any Distance Learning discussion that seeks to determine the true value of the technology—yet they are precisely the questions that have proved so difficult in the Distance Learning debate. The Institute for Higher Education Policy, supported by the American Federation of Teachers and the National Education Association, examined Distance Learning in the United States and concluded, "there is a paucity of true, original research dedicated to explaining or predicting related to distance learning." [4] This finding seems improbable since there have been thousands of studies comparing Distance Learning with "traditional" teaching. Yet most of these studies have been found to be flawed statistically, either not controlling for extraneous variables, or use subjects that are not randomly selected, not controlling for reactive effects, etc.

## Crucial Information for Investing in Distance Learning: Cost and Yield

The debate over the effectiveness of knowledge transfer through Distance Learning continues—but there is virtually no debate at all about its cost, even though in the US alone the annual education budget (K-12, postsecondary and business) approaches one trillion dollars. Are courses administered at distance expensive compared to "traditional" ones? What is the cost per student for an on-line MBA, versus one taught face to face with an instructor? Surprisingly, the cost discussion is muted. The press is beginning to take note of this disparity between the increasing popularity of on-line programs and the lack of cost figures. A recent article found that only the highest volume (high student count) courses were able to operate without a financial loss. [5] Apparently,

Distance Learning does not have an inherent economic advantage.

The literature on Distance Learning implementation in developing countries, like that in the United States, is characterized by a paucity of data about assessment and cost. The extensive JICA report on Africa's Distance Learning, mentioned earlier, includes no information whatsoever about cost or assessment. Even the great multilateral organizations, like the World Bank and UNDP, seem reluctant to do economic outcomes measurements that could guide effective implementation. Are virtual universities in the poorest parts of the world a solid investment? What are the outcomes of courses that are delivered electronically in countries that have only the most tenuous ICT infrastructure? From our perspective there are two very simple dimensions that can and should be used in developing policy level decisions about Distance Learning investment. The first is total pro-

Sample of the Cost/Yield Approach in Developing Countries

Figure 1 describes cost and yield graphically. Five Distance Learning approaches are positioned on an x-y graph. The ideal case is an approach that has low cost and high yield, the upper left segment of the graph. The least valuable case is in the lower right part, where high costs are accompanied by low effectiveness. Correspondence courses are positioned on the graph as being the best mix of cost and yield. This form of Distance Learning has been used since mid 1800's and is still highly effective in poor countries.[8] Despite the difficulties of postal systems and the delays in lesson transmission, correspondence courses are widely employed. In the middle of the cost/ yield continuum are the combination of correspondence with TV as well as with and radio[9] and Internet/CDROM. Each of these has its own strengths and weak-
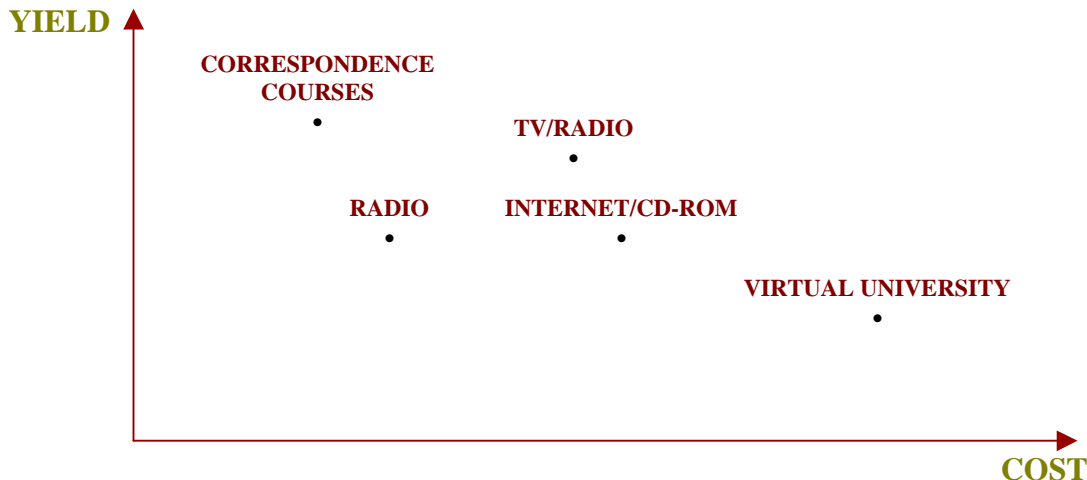
Figure 1: Estimated cost vs. yield points for developing countries' current implementation of various Distance Learning approaches. (Each region would have different characteristics and, over time, the virtual university would move more upward, and probably outward, on the graph.)

gram cost. Program cost includes all the materials, technology, advising, infrastructure, rent, travel, software and hardware, etc., that must be paid by an organization or donor to achieve the desired result. Several viable cost models exist to facilitate this computation.[6] The second variable is yield—the aggregate result or outcome that was obtained for the investment. Yield can be measured in graduation rates, new approaches developed for further improvement, job success after training, etc. A recent study in Romania developed a four-step approach for measuring the yield of technology courses using a traditional model widely employed by large global businesses.[7] The methodologies exist but organizations seem unwilling to employ them.

nesses. Radio is the dominant electronic communications device in the world, but is sometimes cumbersome to use in distance education without adequate recording systems. TV is also popular but not as available as radio. Most African countries, for example, have several hundred radio receivers per 1000 inhabitants but less than a third of that for TV.[10] CD-ROM has the advantage of combining the best of WWW and audio, but the disadvantage of requiring computer skills and culture.

The yield of virtual universities in developing countries is relatively low, compared with the cost. Virtual universities are expensive, require good bandwidth, and need an ICT infrastructure that is daunting, even for a developing nation.

While this method is ideal from a theoretical perspective, it is not likely to deliver results proportionate to its cost for a decade or more. The most successful private virtual university in the US, University of Phoenix, has market-driven entrance requirements; i.e., students must be over 21 and have a job. The degree programs cost between $20,000 and $30,000 per student. Of course, the student must also have access to a good Internet/WWW infrastructure. So far University of Phoenix has less than ten thousand graduates, while most other US private virtual universities have far fewer.[11]

Internet Connectivity—the Digital Chasm

Table 1 is a reminder of the severe difficulty that is entailed by trying to implement a virtual university or any other Internet-based Distance Learning approach in a developing nation. It shows the numbers of Internet host sites and the number of Internet users worldwide. Africa has approximately one-fifth of one percent of the world's Internet host sites. Many of the poorest countries of Asia show Africa-like numbers, too, since over half the Asia totals are due to one country: Japan. (China is emerging rapidly—with over 20 million Internet users. See below) Even in the regions where bandwidth and host site numbers are exceptional, as in the US, Britain, Finland and Netherlands, the kinds of user services needed for synchronous or asynchronous Internet availability around the clock are still not adequate to provide broadband service to a large population. So even the Internet-rich countries do not have sufficient broadband service.

courses, to some Internet-based courses, and ultimately to completely virtual universities. An example can be found in the experience of China in leveraging the potential benefits of Distance Learning. The evolution of culture, infrastructure, technology, content and deployment has led to extremely rapid developments. The diffusion of the Internet in China in business and government has been closely linked to the rise of Distance Learning at Chinese universities. China has experienced two generations of technology-assisted Distance Learning. The first is broadcast/TV-based Distance Learning, which has led to China having the largest education network in the world. This network consists of the Central Radio and TV University (CCRTV), forty-four Provincial TV Universities (PTVU's) and thousands of branch schools and study centers. Over one hundred million Chinese are currently receiving training or further education through special television channels, and as of 1997, more than two million Chinese had received university diplomas from these TV universities. [12] For more on China's CCRTV, see "China: Teacher Training with TV Technology**,"** *TechKnowLogia,* November/December 2000.

China's second distance learning generation, based on Internet technologies, began in mid 1990's. In 1994, the first TCP/IP-based public computer network, China Education and Research Network (CERNET), linked Tsinghua University and nine other universities in a manner similar to the early BITNET in the United States. In 1997, Hunan University became China's first on-line university, and a year later

Table 1: Internet Hosts and Users by Region as of April 1, 2001

Region	Internet Hosts (000)	Internet Users (000)
Africa	265 (0.2%)	2,901 (0.7%)
Asia	8,929 (7.86%)	70,073 (17.8%)
Europe	20,309 (17.9%)	89,066(22.6%)
Oceania	2,062 (1.8%)	17,227(4.0%)
Central America	467(0.4%)	1,538 (0.4%)
South America	1,264 (1.1%)	16,593(4.2%)
North America	80,299(70.7%)	194,556(49.3%)
Total	**113,595(100%)**	**394,573(100%)**

Source: Telecordia Internet Sizer site *Internet Hosts and Users by Country* http://www.netsizer.com/.

Recommended Approach: Slow, Volume-based Growth, Emphasizing Proven Technologies

If bandwidth is a problem even in the most developed countries, what kinds of Distance Learning implementation strategies are possible in Africa, South America and Asia? The answer lies in some of the insights from **Figure 1** above. Simple technologies gradually lead to higher usage rates and ultimately to gradual leveraging of newer capabilities—a progression from correspondence courses to radio/TV

three others joined, to pioneer distance learning development in the country. By early 2000, the initial four pioneers had grown to a consortium of over thirty universities and colleges, with considerable autonomy over admissions, programs and degree offerings. Nearly 200,000 students were offered seats in these programs.[13]

Since less than one in ten graduating high school students has a chance to enter college, there is increased demand from that population to matriculate through technology-based means if the campus-based curriculum is not offered. An-

other large demand comes from students who are already matriculated, including those in colleges, high schools and primary schools. Millions need help with tutorials, focused learning in a specific area of specialization or the opportunity to take a course not offered at their school or region. A recent report of China's Internet Development found that country-wide there were 22.5 million people online, 69 percent of whom used dial-up connections. Almost 30 percent of these users were in the cities of Beijing, Shanghai, and Guangzhou. About 60 percent of these users were between 18 and 30 years of age. Of six main Internet Service Providers in China, one, CERNET, has been designated as the primary provider for the academic community and is offering links in the 500 kilobits-per-second range.[14]

Conclusions

China approach as an exemplar. Distance Learning is destined to become a major contributor in the implementation of new models of teaching, worldwide. The Chinese experience may be highly valuable as a pointer toward the ideal approach. China has made effective, sequential use of all the predecessor Distance Learning methodologies, from correspondence courses to radio, TV, CDROM, Internet and World Wide Web and is poised to leverage that experience into a significant use of virtual universities. This suggests several points that may be appropriate for developing countries that are not as successful so far as China has been.

Move slowly up the technology curve. The example of virtual universities trying to succeed in Africa in spite of the severely limited Internet technology infrastructure is a reminder that the predecessor Distance Learning technologies need to be mastered and ramped up before attempting to leap to higher technology levels

Invest more in people than in technology. In developing countries the budget allocations often are tilted toward equipment, infrastructure and content. A higher overall yield is possible if the major investment is in facilitating users to become fully indoctrinated and conversant with the ICT milieu, thereby assuring the highest return on technology investments.

Place strategy before structure. Often the acquisition of a technology comes before the rational process of planning for its use. A maxim taught in business schools is that the structural decisions, like buying teleconferencing facilities, should be preceded by a strategic agenda, which can result in more rational and efficient use of any technology. Such a process would probably deter the early implementation of a virtual university in a poor country until there had been much more careful migration up the technology curve.

Endnotes

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