

Will Distance Learning Create a Global University?

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With economic globalization and widespread adoption of the World Wide Web, universities have begun competing for enrollees from outside their commuting range—and even beyond their national borders. Although this trend intensifies competition, student concerns remain constant. They care most about the degree they will receive when completing their studies because it will determine their employability. They must also compare the cost of studying at their chosen university with their ability to meet the costs that institution charges. Consequently, many prospective college students eagerly seek high-quality, low-cost universities.

DISTANCE LEARNING TODAY

To meet these needs, many larger universities have embarked on ambitious programs that focus on building regional campuses that feature distance-learning classrooms. In most cases, these institutions restrict their expansion to one state within a federated country: In the US, for example, the University of California system, Carnegie-Mellon, and Purdue all follow this practice. In some cases, however, the expansion crosses national and even continental boundaries.

The Instituto Tecnológico de Estudios Superiores de Monterrey educational system (www.itesm.com) provides an example of this approach.



The profession must weigh the pros and cons of having one university dominate the global WWW-based tertiary education market.

Established in Monterrey, Mexico, in the mid-1940s, Tec de Monterrey now consists of 32 campuses in Mexico and about 540 remote facilities throughout the country. In addition, Bogotá, Caracas, Guayaquil, Lima, Medellín, Panamá, Quito, and Santiago de Chile all host remote campuses, while 1,035 remote offices and classrooms have been opened in other parts of Latin America. Finally, remote installations have been opened in cities with a relatively high Spanish-speaking population: Boston; Miami; Washington, DC; Vancouver; Paris; and Singapore.

One possible development, for Tec de Monterrey or any university that aspires to spread throughout all of Mexico, is to open either campuses or remote facilities in all 2,445 of the country's municipalities. The next step would be to do the same in all Latin American municipalities. Finally, the same might be done in all Spanish-speaking municipalities, worldwide. Potentially, 100,000 such campuses could exist, each serving between 10,000 and 100,000 people. For most Spanish-speaking universities, opening

a campus or office in every municipality of the world is probably unrealistic. Given that English is the most widely used language today, however, a top-ranked English-speaking university would have a more realistic chance of pursuing this goal successfully.

DISTANCE LEARNING TOMORROW

One possible commonsense scenario for future distance-learning development might unfold as follows:

1. In the typical large municipality, sev-

eral distance-education universities open remote offices or campuses.

2. These remote facilities compete with the local, traditional universities.
3. Students compare the price, convenience, quality, and reputation of the competitors. Better-quality universities will be able to employ better teachers, such as those who have influenced development in the field they teach. These institutions also can provide more convenient study conditions and can even charge a lower price for providing these services because high volume helps keep prices down.
4. Over the long term, competition will likely ensure the survival of only one school per municipality, and the winner would probably be the distance-education university. This university will likely eliminate all others from the neighboring municipalities as well, until it dominates the entire region. This pattern will likely repeat across the globe, until only a few regionally

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dominant universities provide distance learning.

5. After a while, the few gigantic distance-education universities will start competing with one another in earnest for global domination.
6. Ultimately, competitive pressures may eliminate all but one distance-learning university from the market.

To succeed in establishing this global university, appropriate political, economic, management, and technical prerequisites must be established. Technical prerequisites include the following:

- a provider domain, focused on ownership of intellectual and material property;
- an administrator domain, focused on logistics;
- a student domain, focused on access efficiency; and
- a professor domain, focused on knowledge delivery.

We believe that knowledge delivery will be of crucial importance for addressing strategic issues such as topic and teacher selection and for determining which content will be delivered remotely to classrooms versus which will be delivered remotely to homes. On the tactical level, knowledge delivery will also address the architecture, organization, and design of technical facilities.

KNOWLEDGE DELIVERY MODELS

We can borrow from computer science the following basic architectural solutions and apply them to knowledge delivery:

- centralized knowledge delivery (CKD),
- distributed knowledge delivery (DKD),
- shared knowledge multidelivery (SKM), and
- distributed shared knowledge multidelivery (DSKM).

The best way to understand the CKD approach is to compare it to centralized

computing, in which the central resource causes the major system bottleneck. Presently the prevailing approach, it suffers from limited scalability and has no future strategic global goals like a world-dominant university.

The DKD approach more closely resembles distributed computing: It distributes knowledge from several sources—each running its own program—without sharing knowledge among sources. This approach eliminates the central bottleneck and introduces competition, but it has no future because it presents inherent obstacles to knowledge sharing.

A few universities—or perhaps only one—will dominate the world's distance-education market.

The SKM approach most resembles symmetric multiprocessing. It enables lower fees through knowledge and resource sharing, but suffers from limited scalability and is thus effective for subglobal growth only.

The DSKM approach most resembles distributed shared memory multiprocessing and thus provides the best solution for global projects. With it, we can develop several model variations and evaluate each one through simulation to identify optimal organizational and design details.

The general functions of a DSKM system include support for the following:

- preserving existing explicit knowledge,
- accessing and learning additional explicit knowledge,
- automatic proactive personalized filtering and distribution of explicit knowledge,
- externalizing and exchanging know-how or tacit knowledge, and
- automatic and semiautomatic knowledge discovery.

The last point involves generating new knowledge based on the analysis of

accumulated explicit knowledge (J. Ma and M. Hemmje, “Developing Knowledge Management Systems Step by Step,” *2nd European Conf. Knowledge Management*, Management Centre Int’l Limited, 2001, pp. 301-319).

Although computer science methods can cover both the first three functions and the last one, the fourth function’s externalization support raises a difficult issue that could slow development of a global university. However, research in capturing live teaching presentations is already under way. Systems such as Fraunhofer’s Lecture Lounge (lecturelounge.ipsi.fraunhofer.de/esportal/root/index), enable multimedia recording and capturing of the tacit knowledge usually presented face-to-face through lectures. Recording these and any available metadata automatically generates a searchable knowledge base of externalized lecturing expertise.

Besides the externalization and capturing support, a fully automated multimedia knowledge production, access, and distribution platform must give real and virtual lecture participants asynchronous access to video recordings, multimedia presentation materials, and scientific background knowledge—all via the Internet. It should also support the automatic linkage, enrichment, and synchronization of these heterogeneous information sources.

Possible future research avenues include the development and evaluation of more detailed knowledge delivery models, aimed at minimizing the cost of the technical and economical prerequisites for success.

OBSTACLES AND DILEMMAS

We believe that a few universities—or perhaps only one—will come to dominate the world’s distance-education market in the next decade or two.

Some, however, argue that governments will decide to protect their national universities. They may well do so and, for some disciplines, extend such protection no matter what the cost. However, for most disciplines,

these efforts will probably share the fate of governments that tried unsuccessfully to protect their national microprocessor or operating system industries.

Others argue that person-to-person contact must occur for students to receive the best education. Perhaps, but, except in rare cases, such person-to-person communication can be handled effectively via the Web.

That some students insist on direct, in-person visual contact presents another obstacle. We believe this habit can be unlearned, however. The half-life period of high-tech knowledge is only 18 months, which means that only 50 percent of what we knew 18 months ago is useful today. Consequently, in addition to acquiring new knowledge, we also must learn to dispose of stale knowledge. Similarly, the half-life of our life experiences is 18 years and dropping. This means that roughly 50 percent of what we knew about life 18 years ago is useless today and, if not eliminated from memory, will only confuse our thinking.

One such out-of-date life experience is the insistence on direct physical contact during the education process. This

obsolete reasoning does not hold for all cultures, however. While true now, it will likely be less valid in the future, as more people become comfortable with advanced technology.

This raises a controversial question: Is the global monoculture inevitable and, if so, desirable? Many trends point to its impending dominance, especially among persons under age 25. After all, North American culture is essentially a blend of many different cultures. Likewise, India contains a vast array of different subcultures and dialects, yet we still view the subcontinent as having a single, diverse culture. The same holds for China. Thus, cultural globalization needn't be a bad thing if arrived at carefully.

Ultimately, computing professionals must resolve a dilemma: Should they support or oppose the development of the global university? We believe that our professional community has a duty to implement what the public demands, while trying to improve and channel its requests. In this case, the public appears to want dis-

tance education—at least for now—and one good way of improving distance education's quality is to globalize it.

If the global university proves successful, what next? Global secondary education? Global primary education? As computing professionals, we should already be considering the implications of these potential developments. ■

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