DARWIN

educational competition in the dot-com world

BY GREGORY C. FARRINGTON AND ROLAND K. YOSHIDA

Photography by Len Rizzi

FAST COMPUTERS AND COMMUNICATIONS HAVE TRANSFORMED global business and are now reshaping the world of higher education. New consortia for the Web delivery of educational courses are announced almost daily, and online courses are proliferating. Innovation and competition are coming to the historically unchanging world of colleges and universities.

Alarmed by the speed at which these ventures are developing, and with some degree of self-interest in mind, many U.S. educators argue that online courses are poor substitutes for the richness of residential education. Some assert—perhaps even hope—that online courses, like many dot-com businesses, will soon vaporize as more shimmer than substance.

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GOES TO COLLEGE

Even though a shakeout period for e-business is under way, it is clear that the structure of business has been radically altered and that business as usual will never be usual again. Will change be as permanent in higher education? Yes. All signs indicate that we are on a path to creating a "new education" analogous to the "new economy." The reasons are obvious. Education is simply too important and our existing methods of delivering it are too expensive, time-consuming, and constrained by established practice not to invite competition. And the new communications and computer technologies make competition possible—actually, inevitable.

What is our vision of the "new education"? Is it one of techno-dazzle for its own sake? Not at all. Computers and the Internet are simply tools, just as lectures, recitations, and homework are tools. We know how to teach with the traditional tools. The challenge now is to discover how to use the new tools to improve what we already do well and to make education more effective, more efficient, less expensive, and more widely accessible. The goal is not to *replace* today's educational methods but to *enhance* them.

New Technology, New Competition

For centuries, higher education has been rooted in secure notions of how faculty should teach and students should learn. Professors have been the holders and purveyors of knowledge. Students have been required to visit professors and attend lectures or seminars or recitations or laboratories at set times. Colleges and universities have not exactly been hotbeds of educational innovation.

To be sure, colleges and universities have long competed on the basis of faculty quality, brand-name recognition,

price, and programs. But there has been almost no competitive market based on the methods of teaching and learning. Virtually all colleges and universities, the old and venerable and those established just yesterday, teach the same way. Only a small fraction of most institutional budgets or faculty time is invested in true innovation in educational methods.

Now the climate is ripe for innovation: costs are high enough to drive it, and new tools make it possible. We have the technological ability to provide learning environments anywhere and anytime. Unconstrained by bricks and mortar, new competitors can enter the worldwide educational marketplace, and established institutions can compete in new ways. The driving forces, as in the rest of the economy, are income and competitive edge.

One of the most widely discussed and controversial new methods of teaching is distance education via the Internet. Though many U.S. educators consider Internet-based education to be a new concept, distance education programs are not really new at all. Colleges and universities in countries such as Australia and Great Britain, and a number of U.S. institutions as well, have run successful programs of distance education for decades. The Internet just makes doing so easier and potentially far more effective.

Of course, just because income beckons and innovation is technically possible doesn't mean that new methods will be accepted enthusiastically, will be adopted quickly, or will be implemented well. What *is* inevitable is a great deal of experimentation. Innovation is coming to higher education, and it is gaining speed at a pace that most faculty curriculum committees find dizzying. The challenge, as in all such change, is to separate the real progress from the razzle-dazzle.

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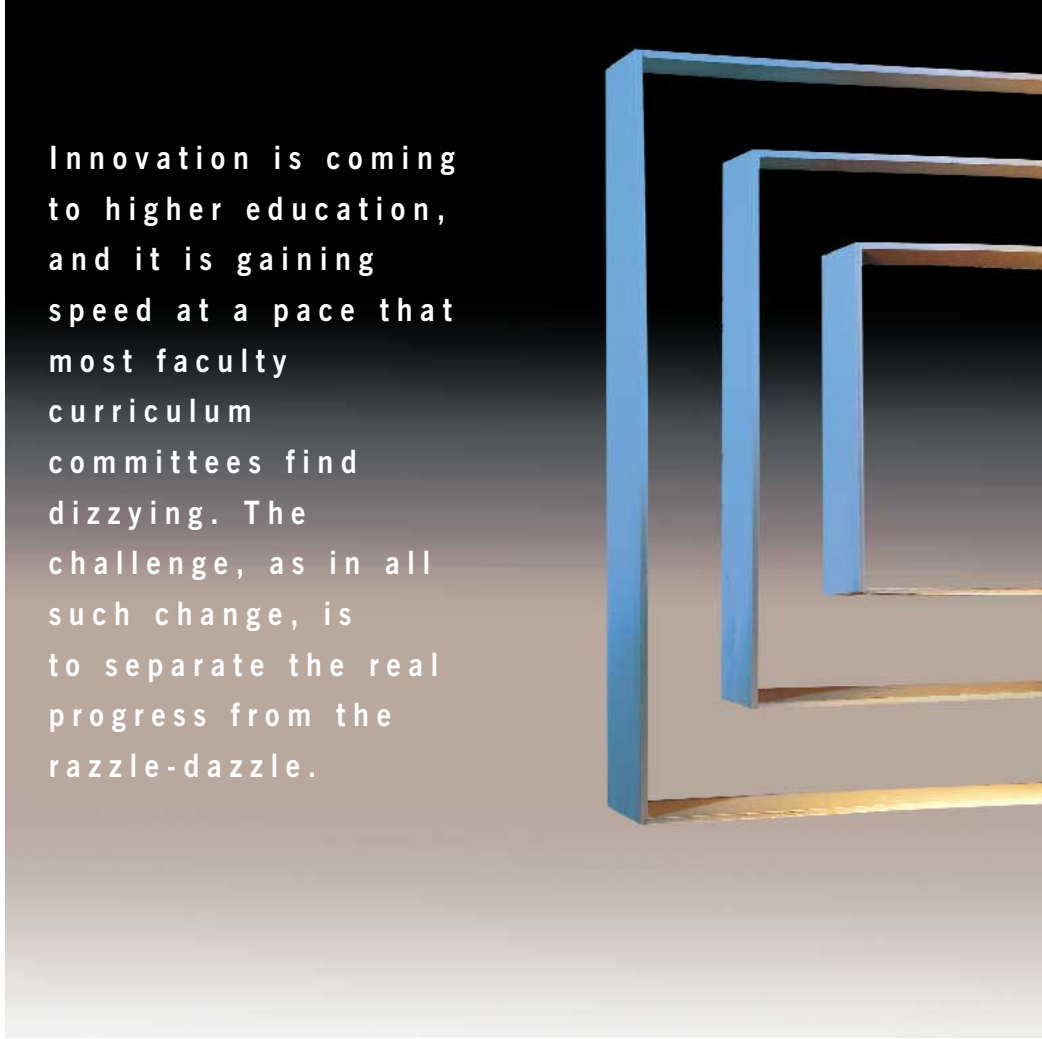


The Virtual Football Team?

Will residential higher education be replaced by Web sites? We certainly hope not. The U.S. residential undergraduate experience is a marvelous invention, a relatively safe halfway house between home and independence. Living away from home, students grow up, learn to work with others, find out about the world from their faculty and peers, are exposed to intellectual, cultural, and human diversity, are challenged to explore beyond their familiar and comfortable worlds, and yes, even attend classes and earn degrees. They seek out peers, professors, and staff to talk, ruminate, and work through what at times seem like (and may be) life crises. In most cases, they bloom, both intellectually and socially. Their parents marvel at them, and they come to marvel at their parents. In short, the process works, and it works very well indeed. It's not the only way to bridge home and career, but it's a very good way.

The United States is fortunate to have a vast and varied collection of residential brick-and-mortar colleges and universities covering a wide range of quality and price and possessing the capacity to meet the demands of its internal market for undergraduate education. The same cannot be said of all countries. China's universities can meet only a fraction of its future demand for higher education. Australia is a large country with a low population density, making residential education more difficult. It has developed strong programs of distance education, and its successes will surely be emulated in China, as China attempts to meet its growing demands for education, and in other countries as well.

Given that the worldwide demand for undergraduate education will only grow and that the Internet enables new and more convenient approaches to education, how will these developments affect traditional U.S. residential undergraduate institutions? Several possibilities come to mind; some increase income, others improve on traditional residential education, and still others are more radical transformations that may be able to reduce the cost of delivering education and its price.

Increasing Income: U.S. Colleges and Universities Go Global

The Internet makes it possible for faculty on one side of the world to teach students on the other and everywhere in

between as well. Some traditional U.S. colleges and universities will surely choose to exploit the power of the Internet and enter the national and international education market by offering undergraduate courses online. In this way, a Chinese student in Shanghai will be able to study at hypothetical Maple College in Michigan. Maple College may choose to support its distance education program with its own faculty or with outsourced tutors who are certified by Maple but who might live in New Delhi. More likely, Maple will participate in a consortium of U.S. and international institutions that collectively take on the marketplace. The rewards for dear old Maple include instant international visibility and tuition income. Given the economic dominance of the U.S. economy and the brand-name power of U.S. college and university degrees, programs following this economic and educational model seem inevitable.

Enriching the Traditional Residential Curriculum

Many other institutions will choose to use the new technologies to become better residential undergraduate institutions—to offer more varied and challenging programs, foster livelier intellectual interaction, and develop stronger residential communities. These institutions recognize that the central power of residential education is the power of the learning community. Their goal will be to use Internet tools to *enhance* traditional education, not replace it. Some methods of doing so include the following:

Computers for Information, People for Interaction. One potentially powerful use of technology is helping students gain information and develop skills so that real faculty can focus on interacting with students and challenging them individually. For example, the introductory accounting course at Lehigh University divides its students into nine sections, each with forty students. Each section has traditionally been taught by one faculty member who prepares and delivers his or her own lectures three times a week. Doing so requires much faculty time and energy spent in repetitively presenting basic information.

The accounting faculty are now redesigning this course and developing an integrated multimedia program that will teach fundamental accounting techniques and replace one traditional class meeting per week. The program will include high-quality streaming videos, study guides, and online quizzes, all accessible through the Web. The faculty have decided to use the multimedia module to teach fundamentals so that they can focus on the more intellectually engaging challenge of discussing real applications in live, face-to-face interchanges among faculty and students.

This same approach might be taken in other courses that involve mastering fundamental concepts and/or developing skills that then must be integrated into a broader or more topical context. If students can learn the fundamentals using sophisticated computer-based modules, faculty can be liberated to challenge students to creatively apply what they have learned. It's all about using technology for what it can do best so that people can be freed to do what they do best.

Rich Offerings for Small Institutions. The Internet makes it possible for small institutions to provide specialized course offerings despite their size. Consider classics. Although the number of colleges with large classics departments is relatively small, even modest programs can become more comprehensive by using communications technology. A good example is the emerging multi-institutional classics department being developed among the fifteen institutions in the Associated Colleges of the South. Most of these colleges have at least a few classics faculty but usually too few to offer a large variety of courses in Greek and Latin culture and literature. By banding together through the Internet and telecommunications, the faculties are creating a virtual classics department linking faculty, course offerings, and students across their institutions. The goal is not to reduce the cost of education but to increase its richness, to make each institution more competitive for the finest new faculty, and ultimately to increase the number of students who study courses in the classics.

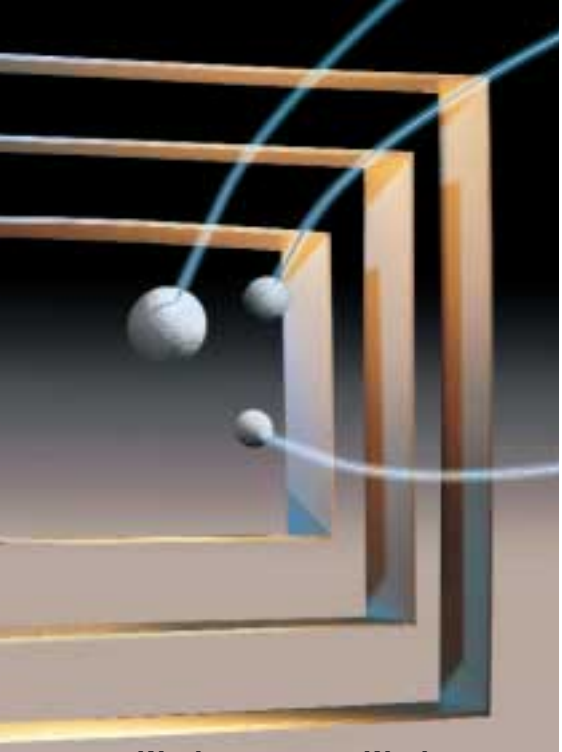
This consortium model can be applied in many other areas and in larger institutions as well, particularly in topics in which each institution has too little expertise to offer a full program or in which critical teaching expertise can best be found outside of academia. Other examples include biotechnology, e-commerce, genetic engineering, and many other fast-changing fields in which any one institution may find it very difficult to offer the highest-quality programs.

Traditionally, colleges and universities have made relatively little use of shared teaching. The goal has been to gather, on the same campus, all the faculty members needed to teach a program. In the future, it seems inevitable that colleges and universities will increasingly be knit together by webs of teaching and research consortia that magnify the power of smaller groups of faculty on individual campuses and make it possible to maintain up-to-date curricula in fields that are changing rapidly. The goal will not be to concentrate all the expertise on a single campus but to have enough high-quality expertise to form the best alliances.

Reducing Costs: More Radical Changes

Whereas distance education may provide new income opportunities for colleges and universities, particularly at the graduate level, the options for significantly reducing the cost of education at the undergraduate level will be more limited unless radical changes are made in the structure of the undergraduate experience.

Fully Web-based undergraduate programs would seem to be less costly than residential education, but whether they really are depends largely on the level of personal faculty-student interaction needed in any particular online program. Online education that is designed to have minimal engagement between student and faculty will certainly be less expensive than highly interactive programs. Which categories of student can learn effectively using online courses is another question. These



Web or no Web, learning must be structured to provide the discipline, guidance, and motivation needed so that a student's potential can be realized.

issues, along with their related economics, are important topics for research in online education.

Web instruction may be quite attractive in societies in which the educational infrastructure is less developed than in the United States, but it is hard to believe that a fully Web-based experience can ever equal the quality of live interaction among students and faculty. The largest expense in U.S. residential undergraduate education is in the salaries of faculty and staff. The only way the new technologies can dramatically reduce the cost of education is to enable the same number of faculty and staff to teach more students. Before using the new technologies to do so, however, institutions must ensure that educational quality will not be unacceptably compromised.

The reality is that on most campuses, the new technologies are being used to enhance education—to make it better, richer, and more diverse—not to make it less expensive. Soaring information technology and energy budgets attest to this fact. Many who felt that technology would quickly make education more efficient and would reduce costs wonder where all the savings have gone. The answer is that those savings were never there, nor are they ever likely to be. Real savings require radical change, not simply variations on traditional methods.

What are some more radical changes that the Internet might make possible? Several come to mind:

Acceleration of the First Year. One possible use of the Internet is to blur the boundary between high school and college. The Clipper Project at Lehigh University aims to create online versions of first-year core courses, specifically in chemistry, mathematics, economics, English composition and literature, and introductory engineering, and to deliver them to prospective first-year students while the students are still in high school. Students anywhere will have the opportunity to get a head start on their first year of college and to complete beginning courses early. The time liberated in the first year can be used to shorten the degree program or to compress more education into the standard four years. This program will debut in experimental form in January 2001.

Interactive Computer Teaching Modules. In most colleges and universities, a great deal of faculty time is spent teaching fundamental courses in which students learn the particular language of a field or develop specific skills. It is possible that some fraction of such courses could be more efficiently and even more effectively taught by sophisticated computer-based learning tools that make it possible for the same number of faculty to teach a larger number of students.

Likewise, it seems certain that a lively publishing industry will develop around the creation of sophisticated learning modules that will increasingly replace the repetitive lectures of courses such as Chemistry 101, so that students can learn the concepts on their laptops and then gather in class for interactive discussion rather than passive note-taking. Other natural applications are in biology, physics, mathematics, beginning engineering, business fundamentals, basic economics, and foreign languages, to name a few.

Andersen Consulting took on this challenge in MBA education, which is expensive both in terms of direct cost and in terms of time away from work. Andersen was asked to determine if a substantial fraction of the MBA curriculum could be delivered through smart computer modules that could be studied by students anywhere and anytime. Andersen developed a series of such teaching modules in topics such as financial engineering, marketing, leadership, and supply chain management, and it demonstrated that students who learned the fundamentals in this way performed every bit as well as students who learned them in a traditional classroom. Principals from this project are now working to launch a new company to extend this concept to other areas of education, including fundamentals of the first year of undergraduate education.

What is particularly interesting about the Andersen MBA experiment is who is driving the educational change. Frequently, employers, not individuals, pay for top MBA education. A large multinational firm, not a business school, commissioned Andersen's experiment, and its goal was to make its employee-education programs more efficient and less expensive. Business schools might object to using the new learning modules to shorten their programs and reduce their income, but ultimately the control is with the organization that pays the bills, not with the academics.

Again, the issue of how well students of various ages, abilities, and levels of motivation can actually learn while using smart Web-based instructional packages is a prime topic for future educational research. One such program is already well under way at Lehigh: researchers in the College of Education are leading a major, NSF-sponsored project to examine these questions as they apply to Web-based science-

education curriculum packages for high school students.

For-profit Competition. Commercial education firms might choose to invade the undergraduate marketplace by offering high-quality, interactive, computer-based learning programs to prepare students in common fundamentals so that they can then transfer to conventional colleges and universities with advanced credit. Many students already complete one or two years of undergraduate education in community college and then transfer to more expensive residential institutions to complete their education and gain a more prestigious name on their diploma. Online education could increase the options available to do so. A key challenge for future research, as mentioned previously, is to determine the effectiveness of such learning options for different categories of students.

Looking Ahead

In looking ahead to future changes in undergraduate education, we should first reflect on the fundamentals. One common myth is that if information is available, students will learn. Well, learning is not the same as downloading. Web or no Web, learning must be structured to provide the discipline, guidance, and motivation needed so that a student's potential can be realized. Unless the new technological teaching methods deal successfully with these issues, they will be no more effective than closed books stacked on a desk—easily avoided on the way to an evening at the pub. However, it seems abundantly clear that in the future, the pathways leading to a college or university degree will be more varied. Innovation will accelerate, and more intense competition will develop among a wider variety of traditional and new players.

Where and when will change occur? In the United States, the biggest initial impact of the new learning technologies will likely be at the two extremes of the educational landscape: (1) programs of high-level advanced education, like the MBA, that target affluent professionals for whom time and convenience are worth a lot of money; and (2) the first two years of college education, in which more efficient learning alternatives can significantly reduce the cost of education. Community colleges will be the focus of much of this innovation as they work to make higher education more accessible to students who do not have the financial resources or time required for residential education.

Another area of potentially major impact is the use of the Internet to offer advanced instruction to secondary school students, as in the Clipper Project. The outcome should be a smoother transition between high school and college, possibly a shorter period of time spent in college, and help in dealing with the lack of qualified science and mathematics teachers in U.S. secondary schools.

Among four-year institutions, the pressure to experiment with alternatives to the traditional classroom for the teaching of fundamentals will be strongest in state institutions, simply because legislatures will insist that they be as efficient as possible. The best established and most respected private institutions, as well as the flagship state institutions, will most likely resist offering their undergraduate programs in anything but the conventional residential format. They will choose to exploit the power of the Web to enhance the quality of their educational offerings and the strength of their campus learning communities.

The fiercest competition will be among the many mid- and lower-level institutions that already compete intensely on the basis of price, albeit often while hiding behind the fig leaf of financial aid. High-end institutions will be free to focus on using the new technologies to improve their undergraduate offerings, making them richer and more varied. Other institutions will use the new tools to survive.

The result will be much more variety and many more routes to the same ends. Higher education is in for a lively period of innovation and competition based on new educational methods. The great power of competition is that it forces high quality and makes achieving that quality the price of survival. In most cases, the student marketplace, not academic committees, will choose the winners. And that is perhaps the biggest change of all. *e*