

Technology: Higher Education's Magic Bullet

By Gerald C. Van Dusen

Technology is frequently seen as academe's "magic bullet," the enabler of reforms that will silence higher education's critics by making the academy more accessible, more affordable, and more effective.

Critics of higher education point to a variety of major problem areas, starting with spiraling costs, particularly tuition and fees, that outpace inflation. They complain that research and scholarly activities take precedence over teaching and student advising. They also point to a curriculum that remains largely insulated from workplace realities and a general insensitivity to the needs of individual, non-traditional, and working adult learners.

How can modern technology address these problems?

On the administrative side, investments in technology have already proven cost-effective. Technology helps streamline admissions, financial aid, registration,

and other transaction processes. On the academic side, intriguing classroom applications of instructional technology have encouraged new ways of thinking about teaching and learning.

But winning the goals reformers have in mind—making the academy more accessible, affordable, and effective—via technology is likely to require a significant overhaul of our postsecondary institutions. Some of what needs to change: the way we use time, how we allocate resources, the role of faculty and other staff, and the mission of our institutions.

A closer examination of how technology affects these variables can yield important insight into the nature and merit of the overhaul we seek.

Higher education has already, of course, begun to expand access. From 1970 to 1995, higher education enrollment increased from approximately 8 million to 14 million, in large part due to adult

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enrollees 25 years of age and older. The traditional age cohort (18-22 years of age), living on campus and attending classes full time, represents today only 25 percent of total enrollment.

In addition, a sizable contingent of distance learners are moving the issue of access to a more central position on the agenda of strategic planners. For some time, distance-learning providers have offered undergraduate and advanced degree coursework to students in their homes, at their place of work, and at other convenient receive sites.

We know, from state and regional estimates, that distance education programs have been growing steadily if not spectacularly.

In the first nationally representative survey of distance learning, the National Center for Educational Statistics paints a clear picture of how alternative modes of delivery are bringing higher education opportunities to those historically disenfranchised.¹

Among the noteworthy findings:²

- More than one-third of colleges and universities report increased use of electronic technology in traditional classrooms and expanded scheduling of distance education offerings. Another 25 percent plan

distance education courses in the next few years.

- An estimated 750,000 students were enrolled in more than 25,000 distance education courses.
- More than half of institutions surveyed use two-way interactive video or one-way telecourses.
- Colleges and universities are exploring new remote sites, such as libraries, prisons, and community-based organizations, but the main goal seems to be expanding entry into students' homes, campus branches, and nonaffiliated campuses.

Higher education's commitment to increased access has been fueled somewhat by increased competition from outside the academy. Education and training programs run by corporations are growing at a phenomenal rate and will likely have staggering consequences for higher education.

Work-site programs were once little more than apprenticeships or on-the-job training to fill the gap between formal education and the technical competence required for satisfactory job performance. But these programs have grown into a formal system of education and training. Witness such corporate colleges as Motorola U., Hewlett-Packard U.,

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and Sun Microsystems' Sun U.

The United States Distance Learning Association notes that Hewlett-Packard is saving millions of dollars annually by opting for distance-learning technology instead of more conventional modes of instruction and delivery.³

In 1992 alone, report Stan Davis and Jim Botkin in *The Monster Under the Bed*, American corporations budgeted 126 million more hours of employee instruction than for the previous year.⁴

"This is more growth in just one year," Don Tapscott observes in *The Digital Economy*, "than the enrollment growth in all the new conventional campuses built in the United States between 1960 and 1990."⁵

Tapscott calculates that these three-quarter million full-time equated students could fill 13 new Harvards!

Meanwhile, new and nontraditional entities such as the Western Governors University, Jones Education Connection (formerly Mind Extension University), and the Colorado Electronic Community College (Colorado's 12th and newest community college) are delivering courses and conferring degrees, particularly in professional and technical fields, to the expanding over-25 cohort of working adults.

The University of Phoenix Online Program is yet another example. Begun in 1989 to broaden

outreach and increase access, today the program enrolls 3,373 students in eight degree programs, having already graduated more than 900 students.

The online program creates an asynchronous (delayed time) learning environment in which students and faculty interact via computer conferencing system, also referred to as Asynchronous Learning Networks (ALNs).

Since nearly three-quarters of the students work full-time, these virtual classrooms—in session 24 hours a day, seven days a week—offer unprecedented flexibility in managing home, work, and college.

Traditional colleges and universities, realizing the potential of emerging technologies, are overhauling two historical components of institutional structure: the use of time and allocation of resources.

As far back as 13th century France, with the establishment of the University of Paris, the professor determined the time and place of study for students.

In medieval Scotland and later in colonial America, the credit-for-contact model was established. Student progress became a function of hours clocked in the lecture hall, seminar room, or laboratory.

Today, asynchronous technologies such as videotape and

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computer-mediated communication make possible venues for instruction not previously available. The question of how to use time in higher education has been revisited.

Technology calls into question another structural component, physical resources. Technology makes possible a complete reversal of information flow. Professors can now interact with students, asynchronously or in real time, at remote sites. Funding for technological infrastructure—particularly faculty and courseware development—is seriously challenging traditional brick and mortar financing.

Distance education and instructional technology have always been on the fringe rather than in the mainstream of higher education thought and practice. As the issue of access plays an increasingly prominent role in higher education reform, both distance education and instructional technology will play more prominent roles in institutional planning.

Another major objective of the reform movement is affordability. Public anxiety over rising tuition and fees is easy to understand. From 1976 to 1996, tuition on average increased at public universities from \$642 to \$3,151; at private universities, from \$2,881 to \$15,581; and at community colleges, historically an

educational bargain, from \$245 to \$1,245.⁶ Nor is financial aid as much help as it once was. Most new money for student aid is now in the form of loans.⁷

One implication of rising costs is a decline in enrollment at traditional higher education institutions. The National Center for Educational Statistics has twice had to revise downward its projections of total undergraduate enrollments for 2005 because current enrollments have not achieved anticipated levels.⁸

Analysts who have looked at demographic trends see a relationship between unremitting tuition hikes and college demographic trends.⁹

To address these concerns, we need to examine what elements of cost can be controlled. The National Commission on the Cost of Higher Education defines the total price of attendance as:

The tuition and fees that institutions charge students as well as other expenses related to obtaining a higher education. These expenses could include housing (room and board if the student lives on campus, or rent or related housing costs if the student does not live on campus), books, transportation, etc.¹⁰

For adult students—the new

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majority in higher education—technological solutions can conceivably reduce some student expenses.

Costs can be partially mitigated by improved scheduling of classes and better allocation of resources. Traditionally, classes are scheduled as much for the convenience of faculty as for students, the majority of whom were once residential.

Today, a class can be convened in real time at remote locations such as work sites or libraries or can be conducted asynchronously over the Internet. This approach can greatly reduce or eliminate customary expenses associated with, for instance, travel, child care, and meals for part-time and nonresident adult students.

For institutions, the savings may not appear significant. Savings that accrue from a shrinking traditional infrastructure—brick and mortar construction and maintenance, for example—may be wholly or partly offset, at least in the short term, by expenditures for technological infrastructure.

A third structural variable includes faculty and other college personnel, such as administration and staff. The perception that colleges and universities are top-heavy with administrators and administrative expenditures isn't valid. Administrative expenditures, as a percent of total educational and general expenditures, have

been flat or declining since 1987.

The argument that faculty tenure and workload are driving up the costs of a college education are also patently false. In fact, the opposite is true.

The National Commission on the Cost of Higher Education reports that institutions have hired more part-time and nontenured faculty and faculty have increased the number of hours spent in the classroom.¹¹

A decline in the relative proportion of tenured full-time faculty to untenured part-time faculty appears to have a stabilizing influence on that portion of educational expenditures allocated for faculty and staff. But should the trend continue, there are serious implications for both the professoriate and for students seeking a quality education.

New and nontraditional educational providers, like the Western Governors University and the Jones Education Connection, are relatively silent on affordability as a goal of reform.

Distance learning providers such as these two institutions, completely dependent upon information technology, would seem the perfect test bed for manipulating structural variables to meet the triad of reform objectives.

In its "vision statement," the

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Western Governors University addresses accessibility but has nary a word on affordability.¹²

Traditional institutions are approaching the issue of affordability in a fragmented fashion. Fewer than half of U. S. colleges and universities have a strategic plan for technology, and fewer than a third have a financial plan. Without such planning, it will be impossible to ascertain what technology can and *cannot* do and what its true costs—usually complex—actually are. Before the question of affordability can be answered, these issues must be resolved.

A third reform objective is institutional effectiveness. What makes this discussion so challenging is that the various stakeholders hold different perspectives on what institutional effectiveness is.

Here, our attention is focused on how emerging technologies can be used to promote effective teaching and learning.

An increasing number of college and university faculty are exploring specific technological applications in both traditional and virtual classrooms.

In the traditional classroom, for example, scientific visualization software may put students in the middle of a complex mathematical, chemical, or biological process.

Such multimedia technology allows students to experience, often interact, with a process from diverse angles such that their understanding becomes multi-dimensional.

What many instructors are learning is that students can become active, often collaborative participants in their own education through these processes.

The transition from “sage on the stage” to “guide on the side” is typically disorienting for veteran instructors, but the experience is often so enriching that skeptics become enthusiasts.

In the virtual classroom, time and institutional resources are dramatically restructured. David Jaffee recently described his experience with Asynchronous Learning Networks. Instead of attending a class at a preset time, he and his students accessed the online class “anytime/anywhere” to download course materials, send E-mail, or interact in delayed time.

To stimulate interaction, Jaffee posted discussion questions. “I was immediately struck by the high level of participation and discussion which exceeded, in quantity and quality, anything I have ever witnessed in a conventional classroom,”¹³ he notes.

More and better studies need to be done to determine the effectiveness of technology-based learning. While several decades of research

This brief analysis of reform objectives and technology has an obverse and unsettling side.

have concluded that there are “no significant differences” between learning delivered in person and learning delivered by alternative media, the research for evaluating effectiveness is inadequate.

Alfred Bork, who directs the Educational Testing Center, puts it this way:

Evaluation of learning materials involving any media is not a simple process, and cannot be carried out in a single straightforward manner ... much of what passes as evaluation of the effectiveness [of technology-based learning material], including much of the research literature, is of little use. It may well be that the traditional notions of educational evaluation are not what is needed; we need a fresh look at what is possible, what should be measured, and what should be done, both with and without the technology.¹⁴

It is unlikely that we will have those new measuring sticks anytime soon. In the meantime, the innovators and early adopters, in both traditional and virtual learning environments, are providing some of that “fresh look” at teaching and learning.

Effectiveness, like beauty, is in the eye of the beholder or, more aptly, the stakeholder. Institutions are increasingly subject to a mar-

ket economy where an “undergraduate education [has] become a commodity intrinsically linked to economic goals.”¹⁵

This brief analysis of reform objectives and how technology might be brought to bear on them has an obverse and unsettling side.

On their face, the objectives have merit.

Who would possible object to making higher education more widely and fully accessible? Who would not want to reduce tuition and fees, particularly for those marginalized by rising costs? And don't we all strive to make our courses relevant and meaningful in a changing world?

The proper mix of technologies can make content accessible to students at a distance and in traditional learning environments. But, as Steven Gilbert cautions, the “anybody/anytime/anywhere” education banner can be misleading:

Education that is available to anybody, anytime, anywhere may be education that focuses too narrowly on access to information and on individual students' narrow self-interest. If 'education' is available anytime to any person who wants it, it is unlikely a common group meeting will emerge from uncoordinated, individual time/place

preferences. The power and attraction of live participation in a group may be overlooked.¹⁶

For educators committed to increased accessibility and the construction of knowledge based on social interaction, Asynchronous Learning Networks may represent a workable solution.

Affordability, too, can be viewed another way. Unquestionably, technologically streamlined administrative services such as registration, course scheduling, and financial aid have proven cost effective. But applying technology to the classroom to reduce costs is really putting the cart before the horse.

Focusing on how technology can enhance student learning instead may yield economic benefits down the road. At present, no one knows what pedagogical applications of technology will produce the kinds of efficiencies that will prove to be cost effective. As one state representative has confessed:

I think we did it backwards. We should have invested in improving classroom learning first and then beaming it out [through distance learning].

What we are getting now in some cases is mediocre teaching that is being put in more places.¹⁷

An investment today in faculty development and support services is likely to pay dividends tomorrow.

Finally, an alternative perspective on “effectiveness” should be considered. Until the Renaissance and Reformation, the notion of “progress” was theological—spiritual and otherworldly. Today, the notion is technological—materialistic and decidedly this-worldly.

In between, the ideal of public education, championed by Jefferson, Webster, and others, posited public citizenship and private virtue as a culture’s progress.

Some of our literature continues to espouse these values. However, along the way, possibly following well-publicized critiques of public education, these traditional values became overshadowed—if not supplanted—by ones that are nakedly economic/utilitarian.

As we shadow the technology innovators and early adopters at our institutions to find out how, we might consider engaging the more thoughtful of the so-called laggards and Luddites to remind us why. ■

Endnotes

¹ NCES 1998.

² See, for example, El-Khawas 1995 and Green 1996.

³ USDLA 1998

⁴ Davis and Botkin 1994

⁵ Tapscott 1996

⁶ College Board 1998.

⁷ College Board 1998

⁸ Kipp 1998

⁹ Kipp 1998

¹⁰ NCCHE 1998

¹¹ NCCHE 1998. The proportion of part-time faculty and staff ... increased from 33 percent of all instructional faculty and staff in 1987 to 42 percent in 1992. In the same period, the percentage of instructional faculty and

staff with tenure declined from 58 to 54 percent. And, the reported number of student contact hours at all institutions increased from 300 in 1987 to 337 in 1992.

¹² WGU 1996.

¹³ Jaffee 1998.

¹⁴ Bork 1991.

¹⁵ Gumport 1997.

¹⁶ Gilbert 1996.

¹⁷ Ruppert 1997.

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