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# Distance Learning: The Shift to Interactivity

*by Gene T. Sherron and Judith V. Boettcher*

*CAUSE Professional Paper Series, #17*

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*by Barry Willis, University of Idaho*

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# Foreword

Not long ago, distance learning was considered to be a quaint but irrelevant university responsibility having little to do with mainstream life in higher education. Many of the most successful programs fought on-campus anonymity even while they maintained strong off-campus followings.

In the past few years, much has changed. Distance learning has become a touchstone for those seeking to keep higher education relevant. At the same time it has become a lightning rod for detractors claiming that higher education is unwilling or unable to hold its own in the potentially lucrative and increasingly competitive education market.

The reality is likely somewhere in between. Strategic partnerships and innovative new approaches to course delivery have evolved. At the same time, higher education culture has proven resistant to change. For institutions which are up to the challenge, the current interest and growth in distance learning presents a new opportunity. While the dangers of competing and failing in this new world of educational access may pose problems, the refusal to aggressively move forward may be the greatest risk of all.

A poorly defined problem has an infinite number of solutions — the challenge is identifying what fits your institutional context. This CAUSE Professional Paper will help the reader define the problems and inherent challenges facing those who thoughtfully confront the distance learning challenge. In the pages that follow, authors Sherron and Boettcher offer a distance learning primer and call to arms. They begin by exploring the changing nature of the higher education market and detailing the challenges posed by a workforce that must continually update and upgrade its knowledge base to remain competitive. After defining distance learning and tracing its 100+ year history, they compare the instructional effectiveness of distance learning to more traditional forms of instructional delivery.

In laying out a basic framework for successful distance learning efforts, the authors point out that no single technical approach or delivery system dominates. There is no technological silver bullet. Educators who want to avoid getting caught up by technological solutions in search of instructional problems must remain firmly focused on the intended instructional outcomes, not solely the technology of delivery. Though most would agree with this logic, the reality is somewhat more elusive. Those in doubt should review first-generation online Web-based courses. Without thoughtful planning, adequate instructional design, and the funding to make both a reality, the result is often bad traditional instruction converted to bad (but easily accessible) Web-based instruction.

Forward progress often requires a step back. In this pursuit, knowledge is power, and Sherron and Boettcher assist in our search with a matrix and related discussion detailing the evolving nature of technological decision-making and the ever-expanding palette of media choices. Their discussion lays the groundwork for informed debate and insightful technological decision-making.

The authors point out the importance of strategic planning and the necessity of re-examining our institutional missions and priorities. No institution can be all things to all people. Those attempting to do too much with too little eventually falter, losing credibility in the process. And yet "doing less with less," as Jim Mingle states in the foreword to a previous CAUSE publication, is a prescription for irrelevance.[1]

[1]Robert C. Heterick, Jr., ed., *Reengineering Teaching and Learning in Higher Education,* CAUSE Professional Paper Series, #10 (Boulder, Colo.: CAUSE, 1993), iii.

Sherron and Boettcher challenge us to explore some fundamental questions to guide our distance learning priority setting, decision-making, and planning. They include:

- What courses and degree programs will we be teaching?
- Who and where will our students be?
- What will our students bring to the experience?
- Which models of distance learning will we be using?
- How will adequate infrastructure be developed and supported?

Realizing that each institution must puzzle through these questions based on its own mission-related context, the authors engage the reader in a discussion of programmatic and instructional design options, the assumptions underlying interactive distance learning programs, and the development costs associated with each. Throughout the discussion they offer examples of how some institutions have successfully dealt with these challenges, while helping us steer clear of the pitfalls that confront institutions stumbling blindly without a prioritized plan.

Success in distance learning requires that we reexamine old challenges in new ways. Nowhere is this more apparent than in the area of faculty development and the institutional incentive and compensation structures currently in place. As they do throughout their analysis, the authors frame the discussion, raise key issues, present examples of how they might be addressed, and leave us to ponder the most appropriate strategy for our own institutional setting.

Lasting change in higher education is more the result of evolution than revolution. Sherron and Boettcher explore the fundamental issues that all successful distance learning initiatives must confront. They do this knowledgeably, with insights into both the process and products of effective distance learning efforts. In doing so they provide a number of guiding principles and best practices that will make the search for solutions a rewarding one. Let the evolution begin!

*Barry Willis*
*Engineering Outreach Director*
*Professor of Education*
*University of Idaho*

# Introduction: The Rush to Distance Learning

In differentiating distance education from other types of learning, the U.S. Congress in a 1992 Office of Technology Assessment report broadly defined it as "the transmission of education or instructional programming to geographically dispersed individuals or groups."[1] By this generalized definition, distance learning has been in existence since the nineteenth century in the form of correspondence courses (or for nearly 2,000 years if one counts St. Paul's Epistles to the Corinthians!). Given that unbounded enthusiasm is usually reserved for new ideas that promise a brave new world and a panacea for all society's ills, why is higher education in the 1990s experiencing such fervor for a concept that has been around for one hundred years?

We propose that the current rush to implement distance learning programs by colleges and universities is occurring for three major reasons:

- the convergence of communication and computing technologies,
- the need for information age workers to acquire new skills without interrupting their working lives for extended periods of time, and
- the need to reduce the cost of education.

The convergence of communication and computing technologies is producing a plethora of hybrid technology products and services. These new products and services will soon permit widespread availability of diverse forms of information, education, services, and entertainment. Some of these products might be able to address persistent and difficult educational problems. Multiple, and occasionally seamless, communication links now exist between homes, offices, cars, schools, and workplaces.

The arrival of the information age is having an impact on workers in all sectors of the economy. Increasingly, they must become more highly skilled — without interrupting work service for extended periods of time. Workers also need to be able to solve many more — and more complex — problems on their own. And workers must stay up to date and knowledgeable in fields that are dynamic and constantly changing. So learning must be continuous and available wherever the people are, and it must be "just in time" and concurrent with work. The widespread availability of information tools promises at least some partial solutions to all these needs.

Quantifying such needs as have just been described is difficult. In *Transforming Higher Education: A Vision for Learning in the 21st Century*, Michael G. Dolence and Donald M. Norris predict that the necessity for new models of distance learning for higher education will expand dramatically in the next century.[2] They estimate that the amount of learning required by every information-age worker by the year 2000 will be equivalent to that currently associated with thirty credit hours of instruction every seven years. This level of learning requirements will translate into the equivalent of the FTE enrollment of one-seventh of the workforce at any point in time. In the U.S. in one year this could be the equivalent of 20 to 28 million additional FTE in postsecondary education. Projected globally, it could mean more than 100 million learners seeking higher education access and opportunities by the year 2000.

If these projections are accurate, every information-age worker will require the equivalent of four college credits a year, which translates to approximately four and a half weeks of dedicated learning annually or forty-five minutes of learning every work day. Other data support these projections. Data offered by Davis and Botkin show that formal budgeted employee education grew by 126 million additional hours in 1992;[3] an equivalent increase in growth in

the usual higher education models would have required thirteen new Harvards. We now have institutions such as Disney University, Motorola University, Hewlett-Packard University, and McDonald's Hamburger University — all of which have evolved to meet the needs of interdisciplinary, niche learning markets. McDonald's, for example, trains employees in sixty-five countries and has accommodations for simultaneous translation for eighteen languages on its main American campus.

Thus education across all segments of higher education — undergraduate, graduate, professional, certification, and lifelong learning — is a growth market. To meet these needs and take advantage of the opportunities occurring, our institutions must fund, design, and implement new flexible learning programs. The needs are great, and our traditional models are no longer the only appropriate delivery mechanisms. How will higher education in the information age meet this demand of the information worker for professional and lifelong learning? Is distance learning the answer?

The third major reason for resurgent interest in distance learning is the cost factor. Our current models of higher education are very resource-intensive, in terms of people, space, content development, and time for learning. Our budgets will not be expanding sufficiently to meet the knowledge requirements of the future using our current models. Can distance learning help to reduce the cost of teaching and learning, and/or the time required to earn a degree?

There is a widespread, dangerous perception that distance learning models can reduce the cost of teaching and learning in the higher education and professional markets. It is true that real cost savings are possible in certain areas — for example, if students do not spend as much time on campus, there can be cost savings in terms of physical structures and maintenance. If employees do not have to spend time away from their work or spend time and money on travel, there can be real cost savings for their employers. Also, part-time students tend to bear a higher proportion of the costs of their education — unless they are fortunate to be among those being reimbursed by their employers.

However, other costs associated with distance learning programs can quickly offset some of these savings. To compensate for the absence of a faculty member in the classroom, programs need to be planned and designed well in advance so they can stand on their own. Also, quality distance learning programs still must provide a certain amount of interaction and mentoring with faculty and tutors online or in person. So, while there will be some savings in the long term, significant investments are generally required up front. And, of course, there is the cost of implementing the technological infrastructure needed to deliver effective distance learning.

There are also some immutable constraints — at least, for now — on the time it takes to learn. Well-designed materials and programs can significantly reduce the time needed to effectively present content; however, until the chemistry of the brain changes, students must still take time to assimilate knowledge, and make judgments about using information effectively. Developing such strategies, intuition, knowledge, and wisdom does takes time.

## Benefits and Challenges

Essentially, distance learning in higher education evolved to provide access to education where otherwise it might not have been available, due to such constraints as geography, time, job and family responsibilities, or finances. Over the years, traditional distance education programs have provided opportunities for learning for people in large, sparsely populated states in the U.S. (such as Idaho, Iowa, Maine, Nebraska, Oregon, and Wyoming) or countries (such as Canada and Australia), and in unindustrialized areas in the third world.

Distance learning programs have also provided options for individuals who desire to combine work and learning experiences, and for those individuals who decide to return to school later in life. Many of these people may have demanding job and family responsibilities and find that the only way they can complete higher education degree programs is through distance education. Students who use distance education do so not necessarily because they prefer it to on-campus instruction, but because it provides a way for them to reach their personal goals despite constraining personal circumstances.

Despite all their benefits, distance learning programs have been — and generally still are — perceived as a second-class version of on-campus learning pro-

grams. The latter are often considered more effective at producing quality educational outcomes. Thus, degrees from institutions that are highly dependent on distance learning technologies, and where much of the education occurs off-campus and off-hours, are sometimes viewed with suspicion, skepticism, and occasionally disdain. This is a perception by many, despite a wealth of studies documenting that students at a distance learn as much as or more than on-campus students, and do as well or better in specified learning outcomes. A 1992 report by Russell on comparative media studies reaffirmed this:

> … no matter how it is produced, how it is delivered, whether or not it is interactive, low-tech or high-tech, students learn equally well with each technology and learn as well as their on-campus, face-to-face counterparts, even though students would rather be on campus with the instructor, if that were a real choice.[4]

The skeptics in us find the perception of second-class learning somewhat ironic, as the goal of determining the desired outcomes of even an on-campus experience is still elusive. Some institutions have defined desired outcomes in accord with their specific institutional mission; however, as a nation, we are far from a consensus on what it means to be an educated person or the process necessary to achieve this goal. So we proceed with our planning in spite of the feeling that something must be missing from distance learning experiences.

This perception may have its roots in the belief held by educators and others that much peripheral learning and acculturation happen during the course of on-campus experiences that are not part of the explicit course activities, goals, and objectives. Even though these components of the learning experiences have never been explicitly defined, it is assumed that off-campus students who do not participate in informal discussions and activities are less likely to incorporate the values and perspectives that often are part of the osmosis or environment of learning. Yet the comparative evaluation studies hold up, because assessments do not address the peripheral or culturative learning or the deep relationships that develop due to physical proximity and regular interaction.

Do the new technologies offer an effective response to the need for interaction in distance learning and a change in this perception — at long last?

## Technology and Distance Learning

Exploring the role of technology in distance education, Barry Willis writes, "At its most basic level, distance education takes place when a teacher and student(s) are separated by physical distance, and technology, that is, voice, video, data, and print, is used to bridge the instructional gap."[5] Willis cautions that even though it is technology that is opening the doors to so many new distance learning models, the use of technology in distance education should remain transparent and user friendly, allowing the instructor and students to concentrate on the processes of teaching and learning. Otherwise, the tail (insert "technology") is wagging the dog (insert "effective teaching and learning").

The trend is accelerating for distance learning programs to use a broad mix of techniques, methodologies, and media. Some of the major challenges designers and planners of the new generation of distance learning programs will need to address include:

- How do we design effective learning systems, with a complex set of media at our disposal, for a virtual teaching and learning environment when faculty and students are not physically together?
- How do we structure information content and provide content access to meet the curricula demands of information-age learners, given the additional power and flexibility of the new technologies?
- What is a good balance of independent study and interaction with other students?
- How do we balance the costs of the new media with the benefits they provide?

This paper examines the technologies that are now available for distance learning and offers some planning and design strategies for implementing distance learning programs. Incorporated into the discussion are data and anecdotes captured in an October 1994 electronic mail survey conducted by co-author Sherron of 800 colleges and universities (to which 350 institutions responded), and a May 1995 follow-up e-mail survey that sought information about library support for the distant learner at the 165 institutions identified in the first survey as having distance learning programs. A summary of survey findings is included in Appendix A.

# The Technologies of Distance Learning

Looking back over the past decades, one can see how the "hot" technologies have affected the way we categorize the modes of distance education. In 1979, Curtis and Biedenbach assembled a reference manual describing the major types of educational telecommunications systems. They tended to categorize the technologies into one of six groups, from public broadcasting to satellite.[6]

Almost ten years later (1988) using data provided by its membership, the National University Continuing Education Association served as the editor of a compendium of information on the technologies used in distance learning. At that time, twenty-three technologies were identified as "common" or used by at least 10 percent of the colleges and universities responding to their survey. Again, these "technologies" ranged from audio to computer to video. The study allowed the Association to identify a number of patterns that emerged from a comparative analysis of the institutional users:

- The evolution of new technologies appears to be continuing at a rapid pace.
- Each institution uses a unique mix or blend of technologies.
- No one technology dominates.
- A recurring theme is the three-pronged thrust that blends audio, video, and computer applications.[7]

While these generalizations are almost a decade old, they are still mostly true today. They also serve as "caution flags" as we race to the winner's circle in distance education in our respective markets.

The technologies used in distance learning have paralleled the technologies used for communication, news, and entertainment. This was and is an obvious cost-effective strategy, as the infrastructure for the technologies can be constructed and paid for by other public/private institutions, and then directed as appropriate to educational needs and opportunities. This has been the case with mail, radio, television, and audio- and videotaping technologies. The same may hold true for the infrastructure essential for the new generation of technologies characterizing the information age.

For now, the parallel may stop there, as the costs for the receiving and sending devices are proportionately higher. However, this is probably a temporary situation. The next five years will see the rapid development of new categories of computing and communication products — or network appliances — that may serve our educational purposes. Initially these products will be limited-function computers designed specifically for accessing and communicating via the Internet and the World Wide Web environment.[8]

A number of companies (Apple, Microsoft, Oracle, Sun) projected release of such products by late 1996 or early 1997. These devices will enable e-mail communication and general Web surfing functions. They will have keyboards, support printing devices, and probably CD players, will use a television set for display, and will cost between $300 and $500. The availability of these "network computers" will have two major impacts: (1) they will set a new price point for Web access and communication; and (2) they will provide an easier step-wise shift to computing for households that do not have any access to technology knowledge.

This type of product may well be the key to enabling the shift to a Web-centric teaching and learning paradigm. Combined with telecourse material, this new home appliance may support the evolution of a much more interactive model of learning for distance education.

## The Generations of Distance Learning Technologies

One of the goals of this paper is to assist in planning for the design, delivery, and support of distance learning programs — whether the programs are half-way across campus or half-way around the world. As

mentioned above, it is clear that the new generation of distance learning programs will use a broad mix of techniques, methodologies, and media. As in other areas of society, a new educational technology does not necessarily replace an old one. A more common scenario is that the new technology takes its place among the range of technologies for meeting a particular set of needs. Or a general technology may have an extended phasing-in period and then settle in for a long period of serving a small niche. The radio is a good example of a technology that was used for distance learning when it was the only technology widely accessible; while radio is still in existence, in the U.S. it is now used almost exclusively for other communication and entertainment.

Table 1 shows that the mix of media to be used in designing distance learning programs has become very complex as the technologies have expanded. The table describes the generations of distance learning technologies according to five characteristics: (1) the media and the technologies, (2) communication features, (3) student characteristics and goals, (4) educational philosophy and curriculum design, and (5) infrastructure. Let's briefly consider how each of these characteristics may impact the evolving interactive distance learning models.

*The Media and the Technologies*

The world's first university distance learning program is said to have been offered through an extension division from the University of Chicago in 1892 under the direction of William Rainey Harper. In the U.S., the use of correspondence courses increased significantly after World War II when many veterans hurried to complete the education they had missed while in service.

What distinguishes correspondence learners is their characteristic self-motivation and discipline, and their ability to learn by reading and writing rather than listening and speaking. Distance learners in correspondence courses miss the opportunity of social interaction and learning from other students. Additionally, the evaluation of the learning must also be written, which rules out performance, practical, and team evaluations. With correspondence courses, the "instruction" must be converted from lecture notes and other materials into a purely written form, a time-consuming process that some instructors find difficult. However, the bottom line is that correspondence courses are the oldest and most cost-effective method of distance education for both the student and the education institution.

### New Zealand Library Studies Certificate

A good example of a correspondence program is the New Zealand Library Studies Certificate Program of the Wellington College of Education at Lincoln University, a well-established and popular two-year program with a captive market. This is basically a correspondence program with sixteen courses. It begins with a two-week residence at the College, with an additional two weeks in residence during the second year. Students also attend a three-day regional seminar. There are about five teleconference sessions (conference calls) each year, again in regional locations. Two groups of sixty students are admitted annually.

One of the key differentiating characteristics of communication technologies is whether they provide one-way, two-way, or multiple-way communication, whether the "ways" are broadband or narrowband, and whether the return rate is fast or slow. For example, the postal service can be broadband carrying print, audio, and videotapes, but the return rate can be painfully slow. The telephone is a good technology for two-way audio conferencing, but it has no visual elements. If one is having an audioconference, any visual supporting material must be on site for all participants. The rapid deployment of the fax machine has facilitated effective audioconferencing by supplying the visual component.

The technologies predominantly used in distance learning in the early and mid-twentieth century (such as print, radio, and television) have been primarily broadband in one direction — fitting the educational model of information transfer from faculty to student. The printed page or the radio or television "talking head" took on the role of the lecturer in transferring information to the students. This delivery mode did not generally incorporate any two-way interaction among students, and provided minimal interac-

Table 1 — Generations of Distance Learning Technologies*

| | First Generation | Second Generation | Third Generation | Fourth Generation |
|---|---|---|---|---|
| **PRIMARY FEATURE** | Predominantly one technology | Multiple technologies without computers | Multiple technologies including computers and computer networking | Multiple technologies including the beginning of high-bandwidth computer technologies |
| **TIMEFRAME** | 1850s to 1960 | 1960 to 1985 | 1985 to 1995 | 1995 to 2005? |
| **MEDIA** | • Print (1890+)<br>• Radio (1930s)<br>• Television (1950s and 1960s) | • Audiocassettes<br>• Television<br>• Videocassettes<br>• Fax<br>• Print | • Electronic mail, chat sessions, and bulletin boards using computers and computer networks<br>• Computer programs and resources packaged on disks, CDs, and the Internet<br>• Audioconferencing<br>• Seminar and large-room videoconferencing via terrestrial, satellite, cable, and phone technologies<br>• Fax<br>• Print | • Electronic mail, chat sessions, and bulletin boards using computers and computer networks plus high-bandwidth transmission for individualized, customized, and live video interactive learning experiences<br>• Computer programs and resources, packaged on disks, CDs, Internet<br>• Audioconferencing<br>• Desktop videoconferencing via terrestrial, satellite, cable, and phone technologies<br>• Fax<br>• Print |
| **COMMUNICATION FEATURES** | • Primarily one-way communication<br>• Interaction between faculty and student by telephone and mail<br>• Occasionally supplemented by on-site facilitators and student mentors | • Primarily one-way communication<br>• Interaction between faculty and student by telephone, fax, and mail<br>• Occasionally supplemented by face-to-face meetings | • Significant broadband communication from faculty to students via print, computer programs, and videoconferencing<br>• Two-way interactive capabilities enabling asynchronous and synchronous communication between faculty and students and among students<br>• Internet good for text, graphics, and video snippets | • Two-way interactive real-time capabilities of audio and video<br>• Asynchronous and synchronous communication between faculty and students and among students<br>• Full 30-frame-per-second digital video transmission with databases of content resources available via the Internet and World Wide Web<br>• Lengthy digital video programming available on demand |
| **STUDENT CHARACTERISTICS AND GOALS** | • Student generally isolated from faculty member and other students<br>• Students must be mature, highly motivated, and disciplined | • Increased contact between faculty and students by telephone and occasional face-to-face meetings<br>• Student generally still primarily isolated, studying in home, often at unusual times, by self<br>• Student highly motivated and self-disciplined | • Increased contact between student and faculty via computer-mediated communication<br>• Increased contact and collaboration between students in the same program<br>• Technologies support the development of a learning community between the students and the faculty | • Increased contact between student and faculty via computer-mediated communication<br>• Increased contact among other students in the same course or program<br>• Technologies support the development of a learning community between the students and the faculty |

| | First Generation *cont.* | Second Generation *cont.* | Third Generation *cont.* | Fourth Generation *cont.* |
|---|---|---|---|---|
| **STUDENT CHARACTERISTICS AND GOALS** ***continued*** | • Students generally working on core educational requirements or lifelong enrichment<br>• Occasionally used for large, isolated groups of students with site monitor or mentor | • Student generally working on core educational requirements, advanced degrees, or lifelong enrichment<br>• Occasionally used for large, isolated groups of students with site monitor or mentor | • Increased face-to-face meetings, often for longer periods, such as three to fourteen hours<br>• May be working on core education requirements, advanced degrees, professional certification, or lifelong learning<br>• More faculty direction and support is possible; less-disciplined learners can be supported<br>• Goal to develop skills, knowledge, attitudes | • Increased face-to-face meetings, often for longer periods, such as three to fourteen hours; also face-to-face contact through desktop videoconferencing<br>• Student may be working on core education requirements, advanced degrees, professional certification<br>• More faculty direction and support possible; less-disciplined learners can be supported<br>• Goal is to develop skills, knowledge, attitudes |
| **EDUCATIONAL PHILOSOPHY** ***and*** **CURRICULUM DESIGN** | • Highly structured materials, such as programmed learning<br>• Materials almost 100 percent prepackaged for stand-alone delivery, supplemented by tutor or mentor, a novice expert<br>• View of student as empty vessel; primary goal is information dissemination | • Materials almost 100 percent prepackaged and structured for independent learning<br>• Highly dependent on instructional systems design to compensate for lack of direct and immediate student-faculty interaction, spontaneity<br>• View of student as empty vessel | • Materials must still be highly structured and instructionally designed; interactive technologies can provide more ad hoc direction and support of learners<br>• Materials may vary from 100 percent prepackaged to about 30 percent prepackaged, with more faculty or mentor direction and support<br>• View of student as active learner, participant, and contributor | • Materials must still be highly structured and designed, but interactive technologies can provide more ad hoc support of learners<br>• Materials may vary from 100 percent prepackaged to about 30 percent prepackaged, with more faculty or mentor direction and support<br>• View of student as active learner, participant, and contributor |
| **INFRASTRUCTURE COMPONENTS** | • Postal Service for delivery of print materials<br>• Radio technology in home<br>• Radio and television broadcast stations and towers<br>• Instructional program designers, developers, producers<br>• Significant up-front investment<br>• Faculty tutors or site facilitators, depending on model | • Widespread television in homes and schools (1960)<br>• Widespread audio and videocassette technology (1980)<br>• Instructional program designers, developers, producers<br>• Significant up-front investment<br>• Faculty tutors or site facilitators, depending on model | • Widespread use of computers and multimedia<br>• Critical mass of ownership of computers with online services (in 1996, about 8 percent in U.S. could access World Wide Web)<br>• User-friendly technologies are needed to ensure access<br>• Instructional program designers, developers, producers<br>• Significant up-front investment<br>• Faculty tutors or site facilitators, depending on model | • Critical mass of ownership of computers with online services<br>• User-friendly, affordable multimedia Internet technologies<br>• User-friendly technologies needed to ensure access<br>• Instructional program designers, developers, producers<br>• Significant up-front investment<br>• Faculty tutors or site facilitators, depending on model<br>• Improved development tools for complex media design and development |

* This table is from the unpublished manuscript of a white paper on distance learning at Florida State University edited by J.V. Boettcher and Barbara Foster (1996). The concept of generations of distance learning was adapted from A. W. Bates, *Technology, Open Learning and Distance Education* (London and New York: Routledge Publishing, 1995).

tion between the faculty and the student.

Another drawback of this generation of technology is that television is also used primarily as a family or group entertainment or news medium. It can be difficult for students to shift from an entertainment mindset to an active learning mode.

A related constraint of some of the traditional broadband one-way technologies was their time dependency. Many of these programs were broadcast only once or twice and a student had to be listening or watching at those specific times (for example, with the Sunrise Semester approach to distance learning a television course was broadcast in the very early morning, such as 6:00 or 6:30 a.m.). The advent of the VCR and cable channel proliferation have made these one-way technologies more flexible and forgiving of people's schedules, enabling timeshifting of the broadcast portion of the telecourses. They also enable the alternative of bypassing broadcast completely by making the content available on videotapes that can be sent to the student and used at any time.

Some of the programs in the 1980s also had computer-based education (CBE) components. CBE materials are powerful in the interaction and simulation richness that they can provide and thus represent a major technological advancement. These materials best support the dialogue between students and resources, and when future advancements are complete, they will effectively support collaboration between students.

Another major constraint of the broadband one-way technologies is the difficulty of creating a meaningful relationship between a faculty member and isolated students, or of developing a community of learners among the faculty and possible cohort of students. The technologies of the third and fourth generations — electronic mail, chat rooms, bulletin boards, desktop videoconferencing, and interactive two-way videoconferencing — now make possible the development of learning communities across time and distance (see discussion below on communication features.)

Especially valuable to distance education was the emergence of two-way videoconferencing classroom technologies. Videoconferencing has grown in sophistication such that classrooms can be used as remote sites to send or receive scheduled instruction. Videoconferencing technologies enable real two-way audio/video communication. These technologies are finally becoming more affordable and easier to operate. Virtual classrooms can be created that consist of one or many classrooms. A virtual classroom might be composed of two classrooms many miles apart linked by a T1 line (point-to-point) or of many classrooms linked by a video bridge and multiple T1 lines (multipoint to multipoint). If the virtual classroom consists of only two classrooms, a videoconferencing class can be initiated by a simple call placed between the two classroom videoconferencing units.

This technology requires video codecs (compression-decompression) units sold by companies such as British Telecom, CLI, PicTEL, and VTEL. Currently the costs for these codecs are significant. Low-end, small-room videoconferencing can be accomplished using relatively economical adapted classrooms for sending and receiving video. A high-end, studio-quality classroom will also have professional cameras, operators, and monitors.

New developments such as CU-SeeMe and QuickTime (videoconferencing software products) are bringing videoconferencing to the desktop level. Thus, in designing distance education programs, three levels of videoconferencing can be considered: desktop videoconferencing for faculty-to-student and student-to-student discussion and collaboration;

### The New School in New York City

The New School in New York City was established for the sole purpose of offering distance learning programs. Its initial and perhaps primary delivery model combines interactive computer conferencing with supplemental audiovisual and text materials provided by mail. As offerings have grown in number, an increasing number of courses in all disciplines are being taught online. The objective is to offer degree, diploma, and certificate programs completely through distance delivery. Another goal of The New School in NYC is to become an "information provider," by becoming a producer of programming for delivery by common television carriers, such as the Public Broadcasting System. The School is also exploring opportunities to exploit the emerging video-on-demand technology through partnerships with telephone and TV cable companies.

small conference rooms for instruction and collaboration between small groups; and large classroom studios for large group regular instruction.

### Videoconferencing at Arizona State

In the early 1990s, Arizona State University (ASU) formed a second campus and was immediately faced with the need to hold cabinet meetings with staff in both locations. The solution was to acquire a modular PictureTel 4000 videoconferencing system for each campus location. This approach was so cost-effective in terms of travel and time that a PictureTel M-8000 bridge was added to the system, and now the three state universities in Arizona hold their Council of Presidents meetings via videoconferencing. Although this application has been used to address an administrative rather than academic need, the lessons learned at ASU were so rich that they are included here:

- Follow the CCITT video codec standard (H.320 or later).
- Transmission speeds of 384 Kbps are preferred, but dial-up, on-demand switched 56 Kbps will work.
- The most important component in videoconferencing is the audio system. People will forgive poor picture quality, but if they cannot hear they will be thoroughly dissatisfied with the system.
- For all participants to be able to see and hear, multipoint videoconferencing events require human and technical protocols such as voice-activated switching, chairman control, self-selection, and windows.
- Regardless of the size of the videoconference room, the conference size continues to grow.
- A technical person will be needed at each videoconferencing site.
- Positive spillovers include: the ability to call spontaneous meetings, increased participation, better coordination and control, and better visual presentations.
- The single most essential element of videoconferencing is management.[9]

*Communication Features*

As pointed out above, lack of a two-way audio-video broadband communication with television or print media restricted the dynamic interchange between the faculty member and the students. This constraint also limited the type of instruction that could be delivered, as the students could not effectively collaborate with each other across distances. Completing a full course and all its components was primarily an individual experience; it was difficult to form study groups, for example, to discuss ideas and share thoughts.

The primary differentiating feature between the distance learning technologies of today and those of previous generations is the capability for timely and personal interaction, the basis of most satisfying relationships. Technologies today allow the delivery of distance learning programs almost anytime, anywhere. (The next generation of technologies that will extend the communication features beyond today's capabilities will include wireless technologies so that one does not need to be "tethered" in order to access communication features. We are all still constrained by battery technology which is currently relatively brief in duration and frustratingly heavy.)

### Interactive Video Infrastructures

Some states have spent a considerable amount of money building an infrastructure to promote two-way interactive video distance education. For example, there are currently over 100 Instructional Television Fixed Service (ITFS) channels licensed to educational institutions in Florida. A satellite network, called SUNSTAR, has placed steerable C and Ku band satellite receiving dishes in thirty-five sites, including one at each of the twenty-eight community college service areas. This network delivers videoconferences within fifty-five miles of every person in the state. As a result of this capability, community colleges in Florida enroll more than 15,000 students annually in telecourses. The Instructional Television (ITV) Office in the Florida Department of Education has leased or purchased over 400 television series comprising almost 5,000 programs for use in schools, colleges, and universities.

Today's technologies enable synchronous communications across long distances and with large groups, providing the perception of "almost being there" no matter where one is. New categories of media events are evolving — online interactive interviews with rock stars, for example. Will we soon have an online interactive interview with a famous astronomer as part of a cohort-based astronomy degree program?

With technologies that allow rapid-response, asynchronous communication, a student can post a question for a faculty member or other students and receive a reply sometimes in minutes. This capability also creates new communication patterns and expectations. A faculty member can manage a course using a variety of social and intellectual spaces on the network. Linda Harasim from Simon Fraser University in Canada has been teaching online since 1985. She has designed a communication structure online with the following kinds of spaces:

- Help area
- Library area
- Virtual cafe/student union
- Seminar area
- Discussion areas
- Conference areas[10]

The combination of all these spaces simulates a campus environment and helps to create a virtual community — a community that comes together for learning for a specific period of time. In many respects, this is not unlike a conference, but extended over a longer period of time and with more structure. In an article on the role of online communities in the commercial sector, Armstrong and Hagel note, "By creating strong online communities, businesses will be able to build customer loyalty to a degree that today's marketers can only dream of, and in turn, generate strong economic returns."[11] Higher education institutions will soon also recognize the potential of such online communities in promoting student and alumni loyalty. These social and intellectual spaces on the network can be a powerful complement to tailgating!

New technologies also enable faculty, students, and support staff to handle all recruiting, admission, registration and fees, and student life online. We can predict with some certainty that we will soon have student life equivalents of all social spaces on the Internet. We know we have become infonauts (information-age workers) if we find ourselves wondering, "Why can't I do this on the Net?"

At this time it is too early to say whether these technologies will truly supplant most of the face-to-face contact desired by people in educational programs. We suspect, again, given the multiplicity of needs and people, that multiple program designs will be successful — some with a high percentage of face-to-face contact and some with little or none.

### *Student Characteristics and Goals*

Students who successfully complete distance learning programs are generally very motivated, highly disciplined, and possessed of a clear vision of the goals that they want to accomplish. Successful distance learning students also generally have the skills to be

#### Mathematics at Florida State

Computer-networked instruction has been used to enhance the instruction of mathematics for Florida State University students. Mathematics instruction usually consists of a teacher working problems in class and the students practicing that skill between classes. To make the process more focused, an FSU instructor started to use the Internet with his class. All assignments were given via the network, and the student could ask questions of the instructor with an expectation of a reply within 24 hours. This system improved instruction and the success rate of the students. The instructor was more in tune with the problems of the students and could teach to their needs. In addition, the students felt that the instructor showed a personal interest in them, even if interaction was through the use of a computer.

With the availability of interactive video for instruction at a distant campus, the instructor now teaches two sections at the same time and interacts with both sections over the Internet. As to productivity, the instructor gets credit for two courses, thus saving the class time of one course. He feels that he spends more time with students outside of class, but it is done on his time schedule. The bottom line is that the instructor saves time and the students' performance has improved.

### Computer-assisted Learning at Thomas Edison

Thomas Edison State College (NJ) has developed a system of high-quality, flexible, and accessible undergraduate education supplemented by a computer delivery initiative called Computer-Assisted Lifelong Learning or CALL. The Guided Study program provides students with semester-based independent learning courses. Students receive a course syllabus and various learning materials, usually a combination of basic texts, video materials, and learning guides. Course mentors monitor the academic progress of students through written assignments sent through the postal system, and examinations proctored at various sites. For faster communications, mentors and students can receive online assistance through CALL which offers e-mail, conferencing, text display, download/upload capabilities, and word processing, plus specialized support of some applications. Recently the College broadened the services offered and now allows all students to dial in to their records for financial information and for review of their transcripts. Another recently added service was access to the Internet for library catalogs, databases, and other users worldwide.[12]

independent learners, and are comfortable in the realm of textual materials. Most students with this set of characteristics also tend to be mature adults. The young adult who was not successful in high school does not fit this profile.

Student maturity will always be an important indicator of success in learning, but it will be less important in the future. The new distance-learning technologies enable faculty to hold meetings, stay in touch, provide structure, and provide frequent response and interaction. They enable faculty or support staff who have the time to give some much-needed guidance, encouragement, and hand-holding to students who need such help. However, there will still be students, particularly younger ones, for whom distance learning programs are not a good match for their learning needs and levels of learning skills.

All students want some support and individual attention from a faculty or mentor. The Open University in the United Kingdom has always had a system of tutors designed into their distance learning programs, and they do not see this design element changing. The Open University's strategic plan, *Plans for Change 1996 – 2005*, states their continuing belief in the need for individualized contact between faculty and student: "... individualized student support, whether delivered face-to-face, through new technology, or other means, will remain fundamental to learning success."[13]

*Educational Philosophy and Curriculum Design*

Another key differentiating factor of the later generations of distance learning is the view of the student and the design principles of curriculum development. In the early 1900s the student was commonly viewed as an empty vessel into which the faculty member "poured" knowledge. In this model, the faculty member was the "one who knew all" and students came to the faculty member with a yearning to know what the faculty member knew. With this philosophy the goal of distance learning was to "get the knowledge content" out to the student. So the curriculum designers analyzed the knowledge content, divided it into manageable chunks, and structured readings to teach the knowledge objectives in these chunks. This sounds like a reasonable approach. What has changed?

Our view of the student is now quite different, and it is reasonable also to say that students are qualitatively different as well. Our understanding of the teaching and learning process is more advanced, and we know that the students need to be actively processing and integrating information for learning to occur. The focus is changing for the curriculum designers as well. Designers still must analyze the knowledge content and determine appropriately sized chunks; but designers must also analyze the skills to be developed and incorporate complex real-world problems into the content materials. Seldom will the problems at the end of the chapter have easy answers, or even any answers at all.

Additionally, students may bring applied knowledge to the teaching and learning event that is new to the faculty member. In these cases, the role of the faculty member changes from the font of all knowl-

edge to the mentor who helps to interpret information in the light of the discipline and a more comprehensive perspective. For effective learning today, designers must plan for interactive, collaborative events among faculty, students, and other resources. The pace of knowledge development may require input from students as well as from the faculty member — especially in the applied fields.

*Infrastructure*

One possible definition of infrastructure is that it is the set of technologies in an environment that supports the mission of an institution. In the case of the early generations of distance learning the infrastructure requirements for student support consisted of what we now view as fairly straightforward technologies — the postal service, radio, television, and audiocassettes. The list of infrastructure requirements for distance learning programs based on computers, computer networking, databases of digital information, and the Internet is daunting. Educom, a consortium of higher education institutions that facilitates use and management of information resources in teaching, learning, scholarship, and research, launched an initiative in 1993 called the National Learning Infrastructure Initiative.[14] This initiative has a goal of defining the components needed for a comprehensive teaching and learning infrastructure, and forming alliances and coalitions to support the development of the components of such an infrastructure.

Curriculum designers must know what resources students will have access to while they design distance learning programs. Research data on the number of students who currently have access to computers support a view that the critical mass of dissemination has been reached and that it is only a matter of time before computer technology, including access to the Internet, is widespread. While designers cannot assume access today for all populations of students, many distance learning programs are moving forward by making computer and computer network access a prerequisite for participating in certain distance learning programs, and other colleges and universities are beginning to require all on-campus students to have their own computers, with the institution providing the network access. This subject is discussed in more detail on pages 25–27. Such requirements enable a much higher level of interactivity and more spontaneity in the teaching and learning process.

## New and Emerging Technologies: Closing the Gap

The new computing and communication technologies may now offer an opportunity to close the gap, be it perceived or real, between the effectiveness of the experiences of on-campus students and those of distance learning students. The World Wide Web and

### Future Roles of Emerging Technologies: The CSU Commission

The California State University formed a system-wide commission in 1991 to examine the role of emerging technologies as a means of addressing the three concerns that dominate virtually all discussions of higher education in this decade — student access, academic quality, and fiscal efficiency. The Commission reached several interesting conclusions:

- Teaching and learning in the information age will be less print-oriented and classroom-bound than ever before.
- It will need to be less labor-intensive and more portable and modular in formats and delivery.
- The home and the workplace may become the classrooms of tomorrow.
- Instructional and support services will be based on the convenience of the consumers rather than that of campus constituencies.
- Education that is truly learner-centered ought to be delivered directly to the individual at a time and in a place determined by the learner.
- The recent "marriage" of computing and various forms of telecommunications can be expected to increase the scope and pace of technological innovation almost beyond imagination.
- Most estimates suggest that the technical means for integrating the two dimensions of non-traditional instruction — delivery and format — are only a few years away.[15]

the Internet and the infrastructure of fiber, cable, and phone lines now offer real-time, 30-frame-per-second, two-way audio and video communications. With these technologies readily available to at least 10 percent of the population, it is time to rethink the role of distance education in higher education.

Educom President Robert C. Heterick has suggested the following strategies for addressing three major challenges — quality, access, and cost — confronting higher education today:

- Don't try to teach more, but rather devise venues for learning that take advantage of the technology revolution.
- Devise multiple program types that support shortened time-to-degree, smaller and more modular courses, and more extensive use of self-paced, immersion learning software resources.
- Reach out to learners rather than bring them to campus. This can increase productivity and reduce or contain cost.[16]

These strategies, and those identified by the California State University Commission (see sidebar) depend on the use of information technologies. All of these strategies can be used to meet the needs of both campus and off-campus (distance) learners. The educational needs of the workforce and the population in general are growing rapidly. The technologies to support these new needs are here none too soon. We must find a way to use them effectively to meet the learning needs of current and future adult students.

# Planning and Designing for Distance Learning

Whenever there is about to be a great change in an institution, it is wise to examine its underlying mission and processes. The traditional mission of higher education institutions has included the creation, dissemination, and preservation of knowledge. Is this still a valid mission?

In 1992, Jaroslav Pelikan wrote a book in which he reexamined John Henry Newman's nine discourses on the idea of a university. Newman's fifth discourse, "Knowledge Its Own End," states, "A university is a place of teaching universal knowledge." In his analysis of this discourse, Pelikan observes that, given the sheer quantity of information today, the ideal of teaching universal knowledge is obviously no longer a realistic goal for any one college or university, "but it is in considerable measure realistic as a goal for the university community worldwide."[17] This statement seems to suggest that global alliances and partnerships among colleges and universities are essential if the goal of teaching universal knowledge is to be attainable in the information age. As we are beginning to understand, building such partnerships, at some level, is critical to an institution's well-being and future.

From the perspective of the teaching mission, then, it is likely that the mission will remain; but this mission will need to be more explicitly defined. Questions we will need to answer include:

- What courses and degree programs will we offer?
- Who and where will our students be?
- What will our students bring to the experience?
- Which models of (distance) learning will we use?

Last but not least, we will have to address how we will develop the infrastructure to support the answers to the other questions.

Each institution will need to answer such questions to determine priorities for the allocation of resources. You may well ask what all this has to do with distance learning. The impact of these decisions is that each institution will become more specialized in some areas, and that colleges and universities will collaborate to maximize their strengths and minimize their weaknesses. It will be those strengths and weaknesses that will guide the development of distance learning programs and partnerships.

Distance learning programs, if well supported and delivered, will also enable colleges and universities to forge close bonds with their students throughout their lifetimes. As Pelikan predicts,

> The university will increasingly take upon itself a major responsibility for a complete life of learning as an integral part of its central education mission. Thus, the future of the university … will be closely tied to how it performs in cultivating this lifelong bond and in carrying out this lifelong mission for each of its several overlapping constituencies.[18]

The emerging new teaching and learning paradigm will affect our institutions in significant ways. In addition to rethinking our missions, it is time to rethink education and distance learning in light of new technologies. Alan Kay, the well-known Apple Fellow, once said that the best way to predict the future is to invent it.[19] In the best tradition of this futurist philosophy, then, the more we determine and act on our own priorities and principles, the more likely that we can make our desired version of the future the probable one.

The sections that follow examine teaching and learning processes and the roles of the people who participate in and support these processes.

## A Philosophy of Teaching and Learning

> *"The aim of education is the development of reflective, creative, responsible thought."*
>
> — John Dewey

Philosopher and educator John Dewey has much to say that is relevant to the development of distance learning programs. Dewey's writing and thinking spanned the late nineteenth through the middle twentieth centuries. At a time when lifelong learning has become a universal concern, it is good to reflect on Dewey's words: "The goal of education is growth. And the goal of growth is more growth. ... Education is not a preparation for life; education is life itself."[20] Dewey based his philosophy of education on the experiences of the learner, that is, in the combination of thought and social interaction.

Dewey also believed that an effective educational experience requires two key processes — interaction and the continuity of interaction. He believed that such interaction is unique to individual learners, that each learning experience builds on a student's own previous experiences. But his goal of individualization and customization for students was an elusive and impossible dream in his era. It is still a dream today, but a more attainable one — in the late 1990s we may finally have the tools to begin to implement this vision.

As to the role of the student in the educational experience, Dewey was steadfast in his belief in the need for active participation by students:

> There is, I think, no point in the philosophy of progressive education which is sounder than its emphasis upon the importance of the participation of the learner in the formation of the purposes which direct his activities in the learning process, just as there is no defect in traditional education greater than its failure to secure the active cooperation of the pupil in construction of the purposes involved in his studying.[21]

Note that this statement goes beyond the requirement for the learner to actively participate in his or her own learning. Dewey specifies that the learner needs to be an active participant in the "formation of the purposes" of the learning. Where are the tools and processes to support this philosophy, if we believe it should be supported?

We know more about the processes of learning now than Dewey did in the 1930s. Research has confirmed the need for students to be active learners, and to participate in the formation of goals for their learning. Also, students must "act on" the available information in some way. Learning is not a process of soaking up information. Occasionally, children are described as soaking up knowledge like a sponge — this is usually said of very fast learners, who can, perhaps, construct or add on to their existing knowledge structures very quickly.

Learning, however slow or fast it is accomplished, is a constructive process. The process of learning is a building of knowledge structures, of making connections and creating new nodes of information, of differentiation of similar ideas, and becoming aware of patterns and relationships. Collaboration is also important to learning as the very process of collaboration requires acting on and working with knowledge. That action facilitates the development of knowledge structures.

It might be said, for example, that the more we develop our brain structures, the more we can learn: the more we learn, the more we *can* learn. It also might be said that all learning occurs at the edges of our knowledge — as we are always adding on to our nodes and structures. Note that this is one reason why scholastic standards and expectations can never be more than minimalist. We can and should identify an elemental set of knowledge and skills for students. But good teachers and good learners increase the differences between students, simply because the process of learning increases the capacity for it.

Dewey spent a great deal of his time and thought on encouraging mankind to move away from the either-or choice between traditional and progressive education. We find ourselves in a similar situation today, focusing on the need to move away from the dualism of on-campus or off-campus (distance) learning. In fact, just as the technologies are converging, so are the on-campus and off-campus programs. Where a person is located most of the time will simply not matter. A faculty member at Penn State who was physically weak and unable to meet his class on campus in 1992 still functioned very successfully as a teacher using the Internet. Students reported feeling closer to this teacher and more competent in the

subject matter than in other, more traditional, on-campus classes. Similarly, Linda Harasim's experiences in teaching in online environments for more than ten years led her to conclude that "students anywhere in the world can be part of a single class. Teachers can be anywhere in the world and still team-teach a class."[22]

Returning to the teaching and learning processes, what is the essence of the educational experience? If we strip away all the accouterments of our educational institutions and structures, we find that a major constant among educational experiences is that of dialogue and communication.

Let's focus on the meaning of the word "dialogue." A dialogue implies a conversation or an exchange of ideas and opinions between two or more people. In our rush to industrialize our schools over the last 100 years, we have been systematically reducing and almost eliminating this dialogue. The dialogue that remains today in higher education between faculty and student is primarily found in the intense relationships between faculty and students in master's and doctoral level programs. What about the dialogue at the undergraduate degree level? At the high school level? Can the new technologies shift the pendulum back to increased dialogue in our educational models?

### *The Processes of Education — Dialogue and Collaboration*

The dialogues in educational experiences today, in classes or cohorts of students, is generally based on one of three dyads: the dialogue between the faculty and the students, the dialogue between and among students, and the dialogue between a student and instructional resources such as books, films, reference materials, research data, and experts. These three dialogues serve as the foundation of instructional strategies and practices. Thus, all desired outcomes may be said to be achievable by a combination of any of the dialogues. And the array of communication and computing technologies now available are powerful enablers of these dialogues. For example, the dialogue between the faculty and students might be facilitated via:

- Two-way interactive audio/video delivered to multiple sites.
- Real-time (synchronous) or delayed (asynchronous) classroom lectures which students might access across high-speed multimedia networks from home, from work, or from anywhere.
- Online electronic discussions, one on one or one to many, including desktop conferencing advising sessions.
- Intensive synchronous on-site seminars or institutes, similar to what we offer in continuing education for professionals.
- Fireside chats accompanied by beverages (fill in your favorite), cheese, and crackers.

The dialogue between and among students might be facilitated by:

- Two-way interactive audio/video desktop conferencing meetings.
- Synchronous or asynchronous project meetings and study groups.
- Online electronic discussions, one on one or one to many.
- Intensive synchronous residence hall room discussions across many residence halls or homes.
- Projects focusing on solving real problems in collaboration with students locally or anywhere on the globe.

And the dialogue between students and instructional resources might be facilitated by:

- Use of electronic resources, such as World Wide Web information sources, including real-time access to global materials.
- Use of digitized lectures or discussions, electronic films, books, or music; viewing of recorded significant events and interviews; access to comprehensive databases of primary and secondary research materials.
- Problem-solving "tests" addressing real problems linked to current events. (Consider situations similar to Judge Ito asking the Harvard law students for copies of their research on media in the courtroom.)
- Satellite events that address key issues and that are moderated by local faculty.
- Joint research projects.
- Application or implementation research.

Online help and electronic mail, "chat" facilities, and bulletin boards are excellent and effective low-cost vehicles for integrating interactive dialogue into what were predominantly one-way distance-learning models. Giving faculty these tools together with as-

sistance in instructional design regarding how to integrate these into their distance learning courses and their on-campus courses can give a needed boost to the quality and satisfaction of teaching and learning models. Students also tend to become more active learners and quickly form communities of collaborative learners.

### *The Gathering Place for Instruction*

The key change in the teaching and learning paradigm of the future will be the single most significant change to occur in education in hundreds of years. This is the move away from the physical classroom as the "framework for interaction" or the "gathering place," to the World Wide Web as the point of departure for a learning experience. Web sites are now as easy to develop as word-processed documents. Support may be needed for the linking and the Internet placement, but the Web is becoming a friendly place to see and be seen. It is a good place for the faculty member to introduce himself or herself to new cohorts of learners; it is a place where much of the normal communication of a course can be conducted. The Web is also the place where much of the dialogue between and among faculty and students can occur. Some of these dialogues will be synchronous and others will be asynchronous.

With the development of the technologies that promise quality real-time videoconferencing, some dialogue will be synchronous, but in the virtual classroom, rather than the physical classroom. Does this mean that our classrooms will be as useless and covered with dust as the room with Ms. Haversham's wedding feast? No, it simply means that rather than being the primary place for interaction, the classroom will become one of many choices for course activities and interaction.

It is an easy leap to see that our campus buildings in the future may look and feel much more like a combination of today's television production studios and conference centers. People will come together for longer periods of "class time" for specific goals and objectives that truly cannot be met in any other way. Despite the rapid pace of technology and the ability to move digital bits rather than people across geographic distances, people will still want to come together occasionally for events and hand-shaking and hugging.

## Design Principles for Interactive Distance Learning

With a move to wide-scale use of interactive strategies and materials in higher education and offering of courses in virtual space and time, instructional design becomes more critical to ensure quality of outcomes.

For most classroom teachers, the concept of instructional design is at the same time very familiar and yet very foreign. Faculty are generally unconsciously competent in instructional design. They are competent in that they have been designing instruction for years; they are unconscious in that they cannot articulate the principles of instructional design. This situation is not particularly troublesome as long as the environment in which they are teaching does not change significantly and they are available to correct any misconceptions. However, change the environment and their teaching role, and it becomes critical that faculty develop knowledge of instructional design or, alternatively, be supported in instructional design in some way.

Fortunately, instructional design principles resonate quickly among faculty who enjoy teaching and having their students succeed. In instructional design, the core questions that must be answered are:

- *Who* are my students?
- *What* do I want my students to know, feel, or be able to do as a result of this course or experience?
- What types of experiences and interactions will facilitate achieving these goals? (This is the *how*.)
- Will this plan help the students to achieve their learning goals? (This ensures the involvement of the learner, providing the *why*.)

### *Background Perspectives on Instructional Design*

The questions that we have posed as essential for designing effective learning stem from an assumption that students come to the educational experience with the goal of increasing their knowledge and their skills. This is not necessarily the case or the primary goal. Many students come to a higher education institution with the primary purpose of becoming certified. In this regard, the students share the expectations of the larger society that needs certified people who are competent practitioners and theore-

ticians of certain bodies of knowledge.

When we know the desired outcomes of education, and when we can measure those outcomes, we can be comfortable requiring individuals to pass a competency test, such as a driver's test, real estate appraisal test, etc. When the desired outcomes are a set of complex cognitive, behavioral, and attitudinal skills, we have traditionally turned to a time-based model of education — with a measure of competency exams at regular intervals. This model says the following: We are not quite certain about the exact nature of the educational outcomes, and we are not quite certain how to measure these outcomes, but the students need to develop a very complex and rich set of skills and experience. And traditionally, if students have spent a certain amount of "time on task" with appropriate interaction with knowledgeable faculty and resources and performance on faculty exams, students have generally performed the expected tasks in society in an acceptable fashion. And, of course, the time we have traditionally agreed upon varies for a bachelor's degree, a master's degree, or other professional degrees.

Thus, in the higher education and professional arenas, we often require a time-based experience coupled with a competency-based demonstration — the bar exam, the nursing exam, and so forth. In other fields, we combine a time-based experience with a set of products, such as the series of innovative research projects required for a Ph.D. in science, or a portfolio of art or writings.

### *Design Assumptions for Interactive Distance Learning Programs*

Let's look at how we might apply these instructional design perspectives to distance education. We can design distance learning courses from the viewpoint of a time-based model or a competency-based model, or some combination of these two. In practice, most courses, including distance learning courses, are designed with a blend of these two models. However, it is important to differentiate the assumptions behind the two as we move into distance learning experiences. State regulations and accreditation models that specify a certain number of required "contact hours" for a three-credit undergraduate course, for example, assume a bias toward a time-based model. But as we have just discussed, a dominantly time-based model focuses on an element that is often irrelevant to the specified outcomes. The time-based model does have a certain amount of validity because we know that learning requires time, but regulations based on time regulate outcomes indirectly and superficially.

We need to design instruction with the knowledge that while time for learning is necessary, time alone is not sufficient to ensure success. We need to design instruction that recognizes that the where and how of that time can be quite open and flexible. Also, we need to design instruction knowing what tools students need to have to be successful in the learning experience.

Most faculty and instructional designers begin planning for a course by specifying a structured body of knowledge for a semester. A concurrent step is to answer the questions above to specify the desired student outcomes. This is the competency-based approach merged with the time-based model.

Given this context, here are some of the principles or guidelines that might be adopted for designing interactive distance learning courses:

- Interactive distance learning courses will be designed based on the core instructional design questions listed above so that the learning is focused on outcomes appropriate to the student and societal needs. These activities will be designed to build skills and relationships appropriate to each student's continuity of learning growth.
- Interactive distance learning courses will use a set of multiple communications media to enable and encourage active and collaborative learning. This means that interactive distance learning courses will use video, audio, electronic mail and communications, the World Wide Web, online seminars, and content resources as appropriate for the goals and objectives of the learning, the characteristics of the students, and available resources.
- A three-credit course is generally assumed to be 135 hours. On-campus courses now assume 45 contact hours. The remaining 90 hours is generally considered to be study time — either individually or in a group using a variety of content resources, such as books, journals, doing research, and simply learning content. This design will be translated into the context of a combination of competency and time-based models.

- Interactive distance learning course design will be based on the principle that the core of education is dialogue and communication, and that balancing the use of the three dialogues — faculty to student, student to student, and student to resources — generally promotes an effective learning experience.

Tables 2 and 3 show how an interactive distance learning course might be structured following these interactive principles. Instructional activities are shown in hours. Let's look at that same course from a content perspective. How does the course content map to these interactions? For each body of defined knowledge, there is a set of core concepts and principles that need to be learned, then acted upon or manipulated or applied in some way, and finally used in complex problem-solving. Note: the core concepts and principles of a field can be fairly fixed; however, the speed with which even "stable" disciplines are changing requires that we plan content resource systems so that regular updating is routine.

To support this type of interactive learning, we need to be developing the kinds of resources that facilitate these types and levels of learning experience. For example, online reference materials, CD-ROMs, and databases — in addition to books — are needed for the basic learning of concepts. Comprehensive, multi-layered discipline and interdisciplinary databases are needed to accommodate the experiences students need for various levels of content interaction and application.

We need materials that offer real-life scenarios and situations requiring complex problem-solving skills. In many areas, this might mean complex simulations; in others, internships addressing real problems. These needs can also support the needs of society for more skilled resources to solve real problems. The conservatory approach to learning has been a grand tradition in the arts; we now are at a point where we should be establishing regular internships and conservatories in other fields as well. At Florida State, the Instructional Systems department regularly provides internships for instructional design students working with faculty on contract projects solving real problems. This helps the faculty and external groups with real problems, and gives students real-life experiences.

This content development model assumes the use of the communications technologies that can simulate a virtual classroom. Thus the time and expense of developing interactive distance learning courses is somewhere between the cost to develop a fully

Table 2

*Example of an Interactive Distance Learning Course Structure — Dialogue Focus*

| | Faculty to Student | Student to Student | Student to Resources | ***Total hours*** |
|---|---|---|---|---|
| Real-time interaction in various-sized groups with structured instructional activities in virtual or real environments | 20 | 10 | 5 | ***35*** |
| Real-time and asynchronous interaction without structured instructional activities in virtual or real environments | 10 | 10 | 10 | ***30*** |
| Individual or group interaction with fixed content resources in virtual or real environments | 10 | 15 | 15 | ***40*** |
| Individual or group interaction with dynamic content resources in virtual or real environments | 5 | 10 | 15 | ***30*** |
| **Total hours** | **45** | **45** | **45** | **135** |

Table 3

*Example of an Interactive Distance Learning Course Structure — Content Focus*

| | General Information | Learning Core Principles & Concepts | Applying Core Principles & Concepts | Problem-solving Core Principles & Concepts | ***Total Hours*** |
|---|---|---|---|---|---|
| Real-time interaction in various-sized groups with structured instructional activities in virtual or real environments | 2 | 5 | 5 | 10 | ***22*** |
| Real-time and asynchronous interaction without structured instructional activities in virtual or real environments | 6 | 10 | 10 | 10 | ***36*** |
| Individual or group interaction with fixed content resources in virtual or real environments | 2 | 20 | 20 | 0 | ***42*** |
| Individual or group interaction with dynamic content resources in virtual or real environments | 5 | 10 | 10 | 10 | ***35*** |
| **Total Hours** | **15** | **45** | **45** | **30** | **135** |

canned, packaged, stand-alone multimedia course, and the cost to develop a course to be delivered in the classroom.

In our current on-campus models, faculty are expected to design and develop for the classroom-centric model in the amount of time they have assigned for delivering a three-credit course. So, our current on-campus models merge the cost of design and delivery. With interactive distance learning the goal is to transform courses in two complementary ways — a move from the classroom to the World Wide Web and the accommodation of students wherever they are. Given that this transformation of the course and the content is a significant task, faculty need additional time to accomplish this successfully.

Florida State University is investing in three major types of interactive distance learning courses:

• *Predominantly Web/Internet Course Model.* These are Web-based courses that combine content resources, such as books and interactive materials, with interactive activities with faculty and other students. The goal is that these courses will provide an option for open and flexible high-demand general education courses for on-campus as well as off-campus students or advanced-placement students. These courses will be developed in collaboration with community colleges, building a database of resources and activities suitable for a broad range of students. This model plans for approximately fifteen hours of synchronous activity; the remainder of the contact time is primarily conducted on the Web with various-sized groups of students interacting with faculty.

• *Candid Class Model.* This model relies on large-class videoconferencing technologies and Web tech-

nologies. Classes meet regularly with the faculty, but for approximately twenty-two hours, about half of the usual forty-five contact hours. These courses also combine content resources, such as books and interactive materials, with interactive activities with faculty and other students on the Internet. One of the advantages of this model is that faculty can move to this delivery mode more quickly, because about 50 percent of their activities can remain the same as in their usual on-campus lecture classroom model.

• *Adapted Media/Web Model.* These are primarily Web-based courses that are heavily based on a series of materials originally designed for stand-alone delivery or for entertainment. This course model will require development of the interactive components of the course that will be on the Web. This model also assumes a mentor or faculty member to provide guidance to students throughout the course.

*Development Costs*

For developing a fully interactive multimedia three-credit course in the Web/Internet model that is stand-alone and packaged for delivery, FSU has estimated the cost to be between $500,000 and $1 million, depending on the sophistication of the materials desired, the cost of the content experts, and the available content.

For those courses that are part of a full degree program using full two-way audio/videoconferencing (the Candid Classroom Model) for about 50 percent of the contact hours, we are estimating the cost of summer salary and one semester release for each three-credit course. For a master's degree program of 36 credits, that means an investment of about $205,000 for faculty salaries alone or about $17,000 of faculty salary for a three credit course. Other personnel costs such as instructional design, multime-

Table 4

*Example of an Interactive Distance Learning Course — Materials Development*

| Content Type | Faculty Development | Purchased Resources (Books, CD-ROMs, journals) | Dynamic & Spontaneous Content by Faculty & Students | ***Total Hours*** |
|---|---|---|---|---|
| 1 Fixed Content of Core Principles and Concepts | 20 | 20 | 0 | ***40*** |
| 2 Fixed Content for Applying Core Principles and Concepts | 5 | 20 | 0 | ***25*** |
| 3 Dynamic Content on Core Principles and Concepts | 5 | 5 | 5 | ***15*** |
| 4 Dynamic Content for Applying Core Principles and Concepts | 5 | 5 | 5 | ***15*** |
| 5 Course Level Instructional Strategies/Directions | 15 | 0 | 5 | ***20*** |
| 6 Individual Help and Direction | 5 | 0 | 15 | ***20*** |
| **Total Hours** | **55** | **50** | **30** | **135** |

dia, and graphic development and technical support must also be factored in, with non-personnel costs of equipment, copyright, and infrastructure costs added to the faculty investment. These additional costs will range from about $20,000 to $25,000 per three-credit course, depending on the level of the infrastructure already on campus and the cost of existing content. (Again, some of these costs of moving into the information age are unavoidable whether or not one chooses to go interactive.)

As part of the development of a Florida State University distance learning master's degree program, faculty are being given access to appropriate technologies and training, technical support, and other services needed to ensure appropriate support for the students. This approach supports on-campus excellence and the move to the information-age university by all the faculty. This has an impact on all other courses taught by this cadre of faculty. With this strategy, interactive distance learning begins to transform the campus.

However, for such degree programs to be cost-effective over the long term, institutions must develop programs with some economies of scale, either substantially increasing the numbers of students or using the same development efforts to produce many related programs, such as professional updating and continuing education programs and life-long learning. Building and marketing components of the developed programs as small components to be integrated into other programs will also be considered.

Another approach to investment is the well-known "seed money" strategy: using teaching and learning innovation dollars to fund single-course projects, with the anticipation that prototype projects will attract other funding, thus creating an environment and a support structure that encourages innovative faculty to transform their courses on their own.

How will all this fit into our institutions? It will not be easy. To respond to the information age, we need people with the "new minds" that poet William Carlos Williams believed possible in his comment, "All that is needed for a new world is a new mind." Let's look at our institutions from the perspective of the entire system.

## Changing the System

Today's computing and communication technologies cannot be adopted in a piecemeal fashion. They require change at the systemic and institutional level. The roles of students, faculty, and administrators are changing; the roles of our institutions are changing — even expanding if institutions so choose. The needs are so great that additional private institutions will be established to target certain market segments.

This change at the systemic level was predicted in 1984 by Albert Bork, a computer scientist from the University of California at Irvine, when he wrote, "Because the computer is a revolutionary device in education, it will lead to new educational structures."[23] We are starting to see some of these new systems emerging now. We need new institutional processes, new support structures, and new teaching and learning resources.

Many of the trends now occurring in higher education are symptomatic of these large systemic changes on the horizon. These trends can help to provoke our thoughts about higher education in the twenty-first century. Some of these trends — modified from Willis[24] and expanded — include:

- Credit transfer mechanisms, credit banks, identification, and accreditation for prior learning experiences are making steady progress toward acceptability.
- Effectiveness and efficiency are expected outcomes of distance learning programs and increasingly of all academic programs.
- Student support systems are being recognized as crucial to learner success — wherever the learner may be.
- High-visibility distance learning courses, rigorously developed, are having a spin-off effect on teaching practices in conventional courses.
- Expectations are growing for broad-based, learner-centered, cooperative/collaborative relationships across educational sectors.
- Production-line, industrialized distance learning models are being replaced by open learning models that respond to the students' needs for access, flexibility, a variety of learning strategies, and effective support systems.
- Previous territoriality agreements are becoming irrelevant.

A few institutions are testing and prototyping new contemporary learning environments, as a way of more rapidly defining and shaping the emerging new teaching and learning paradigm. A good example of this experimentation is Project Vision at Penn State (described in the sidebars on the following pages).[25]

We must proceed on many fronts, experimenting with the impact of new technologies on the teaching and learning process. The demands of education are too great to be met by our old models. We need to design a new teaching and learning paradigm that leverages and fits the power of the technology and the demands of our society where knowledge is expanding at an ever-increasing rate, and people need just-in-time learning and other expert and performance support systems.

## Changing Roles of the Faculty

*"Enroll in the University of the World and learn from the world's greatest experts."*

Is this an ad from the not too distant future? Many have suggested that the new technologies will enable students nationally and globally to take courses from "the" expert on a subject or from the faculty member who is the most entertaining showman in the classroom. While this approach may be used by some colleges and universities or private companies, it is worth noting that the approach assumes the basic educational philosophy that students "take or receive information in a one-way direction" rather than participating interactively in a two-way dialogue. The "expert" approach assumes the classroom or lecture model. It also represents the first response of a group towards a new technology — taking what we are doing and doing it the same way but with technology.

The new technologies enable us to do more. While they do enable some "packaging" of experts, more importantly they enable the capturing of *many* experts in various sized video segments. All these segments can be combined in a dynamic, ever-growing database of experts and world views from which to design and deliver an interactive experience. Imagine a holodeck of the future where we can talk with experts and our current mentor!

There is no doubt that the role of the faculty will change in this new environment. The cost factor is an important one. Models will evolve with greater differentiation among the faculty to reduce the personnel cost. We actually have de facto differentiation today; we just don't admit that we do. In the new models, we will have tutors and mentors to support the students, and provide interaction. We will also have faculty "personalities" that do entertaining demonstrations and programs. We may have a Biology 101 Helpline. And we will have some seminar models that look very much like some of our current models — only all the interaction will be online. What will remain constant is having some individual in the role of support person, mentor, coach. The most enjoyable learning is that which is done together as a shared experience — effective teaching and learning models will incorporate that type of interaction.

### *Mentoring Like Merlin*

The role of the faculty member has already been evolving in this century. The "sage on the stage" lecture model is gradually giving way to the "guide on the side" model, capturing the wave of programmed learning and stand-alone materials and, in some ways, the model of telecourses. The group discussion modes so popular in the last decade are part of the guide-on-the-side approach, a "call me if you need me" or "I'll be stopping by" model.

We propose another model for the information age. This is a model that encourages students to do their best, a model that encourages students to prepare for and reach out for their dreams. It is called "mentoring like Merlin." Let's look at the role of a teacher through the eyes of Merlin and consider how technology might support this intense teaching and learning model.

Merlin had the awesome task of teaching a "once and future king" — the young Arthur.[26] We have the similarly challenging task of preparing our students for many new worlds — worlds that we do not know. What might it mean to mentor like Merlin?

Merlin encouraged, inspired, guided, and loved his student. He philosophized with his student, telling him that the very best antidote to being sad was to learn something. He told him to "learn why the world wags and what wags it." Merlin may have been the first teacher to use "virtual reality," turning young Arthur into a hawk, a fish, a bird — so that Arthur could intimately experience the world from other perspectives and thus develop compassion and a broad understanding, a perspective about being human.

## Project Vision: Distance Learning at Pennsylvania State University

In the late fall of 1994, the vice president of the seventeen Commonwealth campuses of the Pennsylvania State University decided that the time was right to move forward with a teaching and learning project that fully empowered faculty and students. The goal was to move away from the largely passive lecture teaching environment and create an active, collaborative teaching and learning environment using interactive communications technologies. To enable anytime, anywhere collaboration and communication it was determined that all project faculty and students would have a high-function, multimedia laptop computer. The nine faculty selected to participate in the project were then challenged to prepare and deliver in the 1995-96 academic year four first-year courses in which the World Wide Web and other electronic communication tools would be a significant component of the course delivery design. The other half of the challenge was that the faculty could not use the lecture mode to teach, to avoid encouraging students to be passive in the learning process.

Although they could not lecture, faculty could meet with their students in various group sizes (there were a total of sixty students, twenty from each of three campuses). The purpose of the meetings would be to discuss ideas, concepts, and themes, and to share stories and experiences. These face-to-face meetings would also supplement online communication.

The project was designed so that all faculty and students shared a common core of software. The groupware package that was used, FirstClass, provided for threaded discussions, so that students and faculty could have online discussions, observing and analyzing how their ideas and thinking—and perhaps the faculty members' thinking—evolved.

This project could not have been launched without significant investment from the University, as well as two corporate partners (IBM and Bell Atlantic). Investments helped to fund faculty support and training, faculty release time, staff support, additional technical support personnel, physical renovation of learning studios, the laptop computers, and evaluation.

The decision to go with a portable computer rather than a desktop was a critical one. There were two compelling reasons. One, with the laptop, students are encouraged to integrate the computer into their daily activities. If teaching and learning take place in classrooms, in libraries, in dorm rooms, in social spaces on campus, it is important that the students have the tools of learning with

Merlin read and discussed with Arthur some of the Great Works in a mini-world of Socratic dialogue. From these dialogues and his experiences, Arthur developed a core of critical knowledge of history, psychology, and physics. Merlin used the world and its inhabitants so that Arthur could "experience" the world.

Merlin also inspired Arthur to experiment. When King Arthur was about to go into battle against his son Mordred for King Arthur's kingdom, Arthur was old, discouraged, and ready to give up. He regretted that none of the great ideas — chivalry, the Round Table — seemed to have been successful. Merlin replied that they were but ideas, rudimentary ideas; that all thought begins with action; that these ideas were experiments; and that experiments lead to new ideas. Thus progress was being made, despite temporary setbacks.

For today's students we may need to use all the magic at our disposal. We know some of the characteristics of good teaching and learning. We could do worse than mentor like Merlin. Good teachers stimulate, encourage, guide, and challenge students. Good students are mentally active, involved, and experiment in the real world. The magic that technology brings can support the creation of the experiences needed to build knowledge, perspective, and compassion. And all this can be done with the use of interactive technologies, anywhere and anytime.

them at all times, very much like a book. In fact, these new tools are becoming the students' books, notebooks, and pencils. Where would students be without these tools? Another key reason is that this was a project to define the teaching and learning paradigm of the future. In the future, students will carry their computers with them. This decision, however, did increase the complexity of the project, and reinforced the concept that extensive use of technology requires systemic change.

Project Vision targeted the entire context and infrastructure of teaching and learning on each of the three participating campuses. Project Vision required some changes that the future environments might not require. A classroom was transformed into a Learning Studio with thirty network and electrical outlets so that there was a place where all students and faculty could link into the network simultaneously and where all students could unobtrusively recharge the batteries of their laptops. (The room was often hazardous, however, with all the cables and cords linking into the network.)

As technologies continue to evolve, especially wireless solutions and battery technologies, the requirements for physical spaces will change. At this point, the future is unclear on this issue. For now, we are tied to these rooms to ensure network availability and connectivity. As always, however, there are benefits. The Learning Studio enhanced the socialization and collaboration by providing students and faculty a physical meeting place for face-to-face dialogue and project work. This was particularly important at one of the campuses — the Delaware County campus — which has no residence halls; consequently all twenty students were commuters.

Project Vision was also very useful in dramatically highlighting the need for dynamic Internet Protocol (IP) addressing for the network to truly enable anytime, anywhere learning. The Office of Telecommunications had been reluctant to move quickly to provide this. However, the need was clearly evident when the students and faculty had to learn how to make do with multiple IP addresses. Project Vision was also useful in highlighting the inadequacy of the technical support structure on these campuses. Additional investments of personnel, and training of that personnel, accompanied this project.

In summary, this project involved cooperation, commitment, and vision of administrators, faculty, and support staff (technologists, librarians, and so forth) at three campuses, where it affected the curricula, the content material, the students, and the learning environment. This was truly a project that led the entire system forward.

## Student Readiness for the Information Age

Students in higher education vary a great deal, even within the traditional college-age population of the 18 to 24 year olds. Not surprisingly, some of these students are technologically ready for interactive distance learning and some are not. Let's look at a few facts about the students and their access to computers in general and then look specifically at distant learning populations and programs.

The authors' experience and research indicate that, across the traditional population in four-year institutions, close to 50 percent of students own or have access to personal computers. For example, according to 1994 data from Penn State, student ownership of computers averaged 50 percent across all twenty-three campuses. More recent data (from 1995) from Florida State University suggest that student ownership might be as high as 70 percent, although that figure may reflect the student sample.

Also, over the last few years a number of institutions have required that all students have their own personal computers and have ensured this by including the cost of a computer in tuition. In 1995, Wake Forest University took the bold step of increasing tuition by $3,000 each year to cover the cost of a new computer in students' first and third years. Requiring that students have access to computers means that the faculty could assume such access as part of

the teaching and learning curriculum and consequently design it into their course requirements and experiences.

In 1995, according to a *Chronicle of Higher Education* article, there were twenty-one institutions known to be requiring student ownership for the year 1995-96.[27] Of these, four were military institutions, a number of others were technology institutes or engineering-focused institutions, and others were mainly smaller liberal arts institutions. It is worth noting that two of the institutions were branch campuses of large land-grant institutions — the Crookston campus of the University of Minnesota, and the California State University Sonoma campus.

The article related a couple of points of interest. One institution that formerly had required students to own computers had backed off the requirement because it felt the faculty did not require the students to make sufficient use of the computer. Another institution retreated because it did not have the staff to answer all the students' questions or to service the computers. Given the progress that has been made in ease of use, some such concerns may be outdated. However, these two examples reinforce the importance of faculty support and student support in the use of information technologies in instruction.

What about distance learning students and their access to computing? In addition to some institutions requiring student ownership at an institution-wide level, the practice of requiring student computers at a department or program level is common. Many business schools and engineering schools have been making access to computers mandatory and including the cost of such access in the tuition for those programs. Two recent examples include the new Global MBA program at Duke University and a new master's degree program in Open and Distance Learning from the United Kingdom's Open University.

It is easy to predict now that within the next five years, the percentage of students that can be assumed to have sufficient access to computing to take courses that are centered on the Web will grow dramatically, approaching 100 percent in many programs. Two technological trends support this. One trend is the standardization of communications access. The Internet and the Web can be accessed with any type of computer. The next generation of programs on the Web will simply be downloading the required tools for the use of the "course resources." We had been waiting for years for standardization of computing and it is here — it looks different from what we expected, but it is here. The second major trend is the decrease in the cost of ownership of the basic communication and computing software to fully participate in interactive programs. While the costs are still significant, they are not overwhelming. In some cases technology costs can be offset by transportation, time costs, and other expenses such as child care.

Thus, as distance learning programs are developed, one requirement that can be made is that students, particularly in graduate and post-graduate programs, be responsible for their own access and support of the technologies.

Regarding the approach of the learner to distance learning programs, substantial research has been conducted to demonstrate that there is "no significant difference in achievement levels between distant and traditional learners." However, the same research reveals a considerable variance in student attitudes and satisfaction levels.[28] Some of this variance can be attributed to variations in the amount and quality of support available during the distance learning experience. Three elements have been found to contribute to successful distance programs: timely student feedback, on-site support and facilitation, and access to library materials. The key variable appears to be the on-site facilitator, and a majority of students also indicate that success in the course requires access to library materials.

Students appear to be ready for online and Web interactivity. This does not mean, however, that they do not need support for learning in this new environment. Readiness consists of both an interest and a desire to start learning using these new tools. Readiness also means that students know how to make the most of these new interactive environments. The truth is that both faculty and students need support in learning how to use these environments. Interactivity and active learning is now feasible; how to achieve it needs trial, exploration, and research.

As has been noted earlier, student readiness for online interactivity is likely linked to their general use of computers. Some students are already so dependent on the technology for their work and communication that they would find it strange and unwieldy to communicate and learn without it; others

still find the technology somewhat strange, and lack the support to use the technology without high levels of frustration.

In most cases, however, students who are not yet ready would like to be, and will respond eagerly to an opportunity to learn the new ways of learning along with the new content.

## Faculty Development and Incentive Issues

Because of the options and opportunities it affords, distance education poses unique challenges to the traditional culture of higher education. If the faculty are to embrace distance education, the administration must consistently respond to traditional faculty concerns with fresh ideas and innovative approaches

A number of actions reveal potential resistance by the faculty to the new models of distance learning. For example, the American Federation of Teachers union released a task force report with recommendations that would sharply curtail or restrict the rapid deployment of new distance learning models.[29] Some of the recommendations include opposing Internet courses — unless they meet faculty members' standards of quality — and restricting the number of credits students can receive for distance education. The report also encourages the AFT faculty to become more active in acquisition and use of technology in instruction, and to become aware of faculty and staff rights in the design and delivery of distance learning programs. The recommendation about limiting the number of credits to be earned by undergraduates was discussed at length in an *Educom Review* interview of James R. Mingle and Larry Gold. The key point made in that article was that faculty or someone representing educational quality needs to be asking the question, "Does this make sense educationally?"[30]

These are good questions and encourage the kinds of discussion on key issues that will be emerging as new models of teaching and learning develop.

### Sample reactions of students

A current distance learning program offered at Florida State University involves 80 residental graduate students and 80 graduate students in four remote locations — from one end of the state to the other. This "first ever" program has elicited a range of reactions from students:

*Excited* — Students are initially excited about being a part of the new world of distance education, but this wears off after the first month.

*Forgiving* — Because it is something new and unfamiliar to them, the students don't expect everything to go perfectly. They will forgive a "jumpy" video and even occasional problems with the audio (as long as the latter is quickly fixed!).

*Grateful* — There are many people who are underserved educationally. They are grateful for the chance to participate in distance programs, to the extent that they will even pay more.

*Studious* — Distance learning students are so pleased to have programs close to home that they are unusually conscientious about doing their assignments and getting them in on time.

*Development Issues*

Willis identified a number of critical faculty development issues to be faced:[31]

*Promotion and tenure*. It is appropriate that educational bureaucracies recognize the legitimacy of distance teaching and reward this effort as they do more traditional forms of teaching.

*Release time*. Adapting traditional instruction for distance delivery demands concerted and time-consuming effort. It takes about twice the time to develop a distance delivered course as it does a traditional course.

*Course "load."* To address the uneven demands of traditional versus distance teaching, an institution-wide distant teaching practices committee should be established to deal with such issues on a course-by-course basis.

*Course updating and revision*. The frequency of course updating and who has control of it is so variable that academic administrators would be well served by developing explicit procedures to address course revision issues.

*Publishing*. Distance education has blurred the traditional publishing boundaries. Again, institutions should progressively consider review criteria before faculty interest fades in non-traditional methods of publishing.

*Faculty mentoring.* A feeling of isolation is not unusual with faculty dealing with a multi-campus situation. One strategy for addressing this problem is through a faculty mentoring network with "veteran" distance learning faculty assisting the "first-timers."

*Consistency across departments.* Many schools have unintentionally created a system of haves and have nots through differing policies on release time, overloads, and the like. The obvious approach is to develop and implement consistent policies that ensure fair and equitable distribution of resources and rewards, institution-wide.

### *Compensation Issues*

Most state-funded institutions take the position that being a faculty member is a full-time job and that faculty, therefore, cannot teach even one extra course without detracting from their regular work. It takes a top-level sign-off for a faculty member to gain extra compensation for courses taught "off-load." Many institutions set up a continuing education unit which has, as one of its functions, the administration of educational programs at local, but off-campus, distant learning sites. In such arrangements, the unit can contract with its faculty or adjuncts for teaching. Usually, these continuing education units are self-supporting and set the compensation packages based on market conditions. This "profit-center" approach is valuable because it makes each program stand on its own economic value. The rates are set to break even, in most cases. Even so, very few programs are allowed to continue for more than one cycle without recovering costs. In addition to monetary compensation, it is perfectly acceptable to reward extra effort by faculty through compensatory time, additional resources for teaching and research, and professional development.

Providing appropriate compensation for the faculty and staff in recognition of additional effort and gains in productivity has always been and will continue to be a challenge in terms of fairness. As colleges and universities move into new teaching modes, whether at a distance or not, it would be ideal if the issue of compensation package changes could be avoided until new models can be tested and refined. Experience has demonstrated that once "bonus" or overload programs are begun, it is difficult to modify them, especially downward.

However, some distance learning programs are quite demanding. So it is important to have administrators of distance learning programs document the activities of faculty and staff to determine who should receive additional compensation for the sake of fairness. In some cases, the distant class, when taught concurrently with a local class, would be regarded as a separate section or course and count "in load" for the faculty — in effect a double course/section which should earn time in the faculty "contract" for research interests and the like. The administration should recognize that such doubling-up is really twice as much work in terms of additional class preparation for the larger group or in the use of a new technology. Certainly, the student evaluation process, such as preparing and grading exams and projects, is an added load because of the number of students involved.

## Infrastructure Requirements

What does all this mean in terms of infrastructure requirements for higher education institutions? At a general level, our campuses need to be technology friendly and supportive to students, faculty, and staff. The technology infrastructure will become increasingly important as the desire to access people, processes, and resources anytime, anywhere becomes more widespread. In addition, a support structure of human and information resources will also be critical to the success of distance learning programs.

### *Networks, Buildings, and Spaces*

A major part of the foundational structure for the distance learning enterprise will be its undergirding by telecommunications in general, and networking in particular. The first tier is the intracampus network that supports voice, data, and video communications. The second tier is the national network which will not only provide access to shared resources, but facilitate cooperative ventures between and among universities, polytechnic institutes, and the private- and public-sector institutions interested in links to tertiary education. Finally, the third tier will provide access to global external resources — databases, commercial services, and other specialized offerings — which are necessary to empower students, staff, and faculty in their roles as learners, information workers, teachers, and scholars.

Increasingly, students and faculty will have their own desktop or portable computers or access appliances. Thus campus buildings and spaces, wherever students and faculty are — student unions, classrooms, office buildings, learning studios, and "gathering places" — will all need to be linked to the information highway. Additionally, access from people's homes and offices will be a key component of the infrastructure.

Even more substantive changes will be needed in our physical buildings. What new types of teaching and learning spaces will we need to support the evolving teaching and learning paradigm? If students and faculty come together less frequently (two to three times a semester) but for longer periods of time (eight hours, three days) what impact does that have on the design of our "classroom" buildings? Will we need mini-conference facilities instead? If the average age of the students changes due to the continual professional updating and life-long learning, will we want to change the overall ambiance of our buildings to more appropriately meet the needs and expectations of mature adults? What about the technology requirements? Will we need or want mini production studios wherever we have seminar rooms and auditoriums today? Should these facilities provide for ways to have meetings and seminars with a portion of the group in the rooms and others in remote locations providing full two-way audio/video, so that one can truly "be there — almost"? Will we need more large rooms with access to many smaller rooms for breakout sessions? It appears that we will need facilities that accommodate course launching meetings, celebration events, and standard discussion and debate meetings — a wide variety of campus spaces to accommodate the new teaching and learning paradigms. And that probably means that we will not need any more "regular" classroom buildings.

In addition to the physical spaces, social and intellectual spaces will be needed on the Web. This will require high-volume fast servers, significant storage spaces, and Webmasters to manage and ensure accuracy and timeliness of content. Faculty will need Web sites for their materials, digital libraries will need to be in place. Data will need to be maintained; and the best place for many of these servers will be close to where the data stewards will be. We will need alliances with publishers for access to databases of content. All these networked resources will require access points everywhere, not unlike the telephone systems today.

Just as the new paradigm of interactive distance learning depends on a mix of technologies, so too a variety of physical and virtual spaces will be needed. A key characteristic of the new paradigm will be customized choice and design.

*Human Resources Support*

With the increase in dependency on information technologies in the new teaching and learning paradigm, more human resources technical support will be needed. One may well wonder at the large discrepancy between personal computer ownership of 35 percent and the 8–10 percent figure of Web use. Might one significant barrier be the difficulty of configuring one's system and keeping it in sync with the network systems?

Many people we know who use their computers and modems at home have had to rely on professional setup help, making it a top priority for a week to get it done. Many of us panic if a problem appears. One of the authors spent the greater part of an hour one Sunday afternoon trying to diagnose a problem with a modem that "had just been working perfectly fine" before figuring out that the problem was not with the modem at all, but with the phone line — the phone had been left off the hook in another room! How do we address this barrier with a population that cannot learn how to program their VCRs? This may be an old analogy, but it is not outdated.

Another difficulty which is seldom mentioned is not so much the technology itself or the documentation, but the need to physically get down on one's hands and knees behind the equipment with a flashlight and magnifying glass, while trying to read the manual. With an aging population, these are significant barriers. One reason children can do this more easily may be that they have better eyesight, are shorter, and have smaller fingers. Never mind that they can't read — somehow they just know what all those symbols mean!

People support is absolutely essential. People primarily need help in getting started, as the first setup is the most difficult. The learning curve is steep, and adults who are focused on the goal of getting work done do not want to stop and learn a lot "just in case"

they need it. People want to get on with their work. So "just-in-time" support is also important. And this type of help is needed whether one is on campus or off campus, whether it is 2:00 in the afternoon or 2:00 in the morning. We need systems in place to provide that type of support for the use of the technology while the technology is being reengineered to be easier.

There are ways to reduce the number of support people by setting up structures that help people to help each other. There are fairly good data to indicate that the first strategy used by people who need help is to ask a colleague, friend, or anyone who happens to be around. This strategy is popular because it is highly effective. The next strategy is to try to "look it up" with the online manuals, World Wide Web resources, and so forth. Both of these strategies may be effective. So calling a help line is not the first action to solve problems. Simply posting instructions with technology in the classroom or labs is often useful as well.

There also needs to be an appropriate balance between central support facilities and college or department support people and facilities. The balance of people and facilities at each of the major levels within an institution will vary depending on the institution. The key principle is that some type of support is needed at the institution level, providing a focal point for the technology support. Then this support must ripple out into support at the college or department or institute or program level.[32]

Nowhere are the support challenges more pivotal than in the area of the faculty and *their* support: there can be no doubt that the ultimate success or failure of distance learning is inextricably tied to the enthusiasm and continuing support of the faculty. This support must begin with faculty training, which is critical to the success of any distance education program. In fact, according to Willis, designing, creating, and implementing effective in-service training of the faculty is the most efficient pathway to the long-term success of distance education.[33]

For example, special support is needed for the new technologies of videoconferencing and television courses. Using these kinds of facilities requires a new set of etiquette tools, and new approaches to teaching to ensure that students — even at remote sites — feel involved and part of the "class." The challenges faced by the faculty at a distance are imposing. Willis offers a few thoughts: faculty need to develop a level of comfort and proficiency in using technology as the primary teacher-student link, and faculty need to learn to teach effectively without the visual control provided by direct eye contact.[34] Many of the more sophisticated classrooms currently have camera operators to make the most of the faculty member contact with the students at multiple sites. Some of the new technologies are reducing this dependency on people, but some such support is necessary to troubleshoot the inevitable problems.

*Information Resources Support*

The phenomenal growth of the Internet and the information resources available through it places most universities and colleges in a unique and powerful position in terms of technology and its capacity to open up previously unmatched information resources. Unfortunately, there are a number of fundamental problems with respect to adequate information resources for extended exploration and research (beyond required texts) that colleges and universities need to grapple with when developing and delivering distance learning programs.[35] The content of distance learning courses may be limited by the high cost and space limitations of set texts. In a resource-rich nation, students do have the option of using the local library; in the rest of the world, library books may be inaccessible or scarce. But even where libraries are relatively accessible, shortages of book copies, shortages of available staff, and limited hours of operation convenient to distance students pose serious handicaps.

Thus, recognition is growing that effective distance learning programs will need to be innovative in providing several forms of student and academic support, such as the library, and providing staff resources and facilities to make the remote learning site comparable to a normal campus experience.

The library staff can expand their support of distance learning programs through the following:

- A more immediate response to requests for articles will be necessary. This might mean restricting the availability of serials to "Reference Only" and/or have them online in digital form.
- More of the collection may require duplicate copies, which can reduce the range of materials other-

wise purchased.

- Assuming distance learning students will have access to the online catalog, additional resources will be needed to send the materials to the students by fax, mail, or e-mail. A similar financial impact would be felt from the use of commercial document supply services, such as Uncover.

As with other forms of student support, some consideration should be given to the identification of staff resources to make the remote learning site comparable to the on-campus experience. At remote sites, what might be needed is a jack-of-all-trades type of employee who is capable of handling library, computer, communications, and student services support. But perhaps that is expecting too much from one individual. It might be more realistic to identify an ombudsman who would know whom to contact back at the main campus to address particular faculty and student needs. The goal is to assure that being on a distant campus is as good as being on the main campus.

In our first e-mail survey (see Appendix A), 74 percent of institutions reporting distance learning programs said that they provided library support services to students who were remote from the main campus. The follow-on survey in the spring of 1995 found that 71 percent of the institutions reported providing library service to their distance education programs. Of those, 40 percent reported they had established branch campus libraries specifically to support the distance learner's library and information needs. This means that the majority of the library support had to come from the main library or branch libraries back on the main campus. Interestingly, a number of institutions had arranged for support for their distant learners through agreements with community colleges, other universities, and private libraries that were closer to them. Those that provided support from the main campus addressed the need by specifically identifying a librarian to assist distance learners. The range of library and information services offered to these students included reference, bibliographic instruction, and inter-library loan. Other services provided included access to the online catalog and the use of an 800 telephone number for ease in contacting the main library.

A new twist in support of the distant learner is through electronic networks which include such features as e-mail, word processing, database software, and spreadsheet software. Thirty-four percent of the campuses responding to our survey gave the distant learner electronic access to services such as the main library's CD-ROM databases, with 22 percent of those not currently providing access planning to do so in the near future.

## Embracing the Future through New Partnerships — Internal and External

A common issue in the establishment and implementation of distance education programs is where the unit responsible for planning and implementing a distance education program reports within the organization. Many would point out that effective programs are more a result of developing networks of relationships than focusing on line operations, that leaders at the highest levels of the organization need to be involved, and that success is more likely if visible support comes from the president. For example, the University of Nebraska at Lincoln developed what is now known as Nebraska CorpNet, a program that provides on-site training for business and industry using live broadcast TV. Leadership for this program came from the chancellor through the vice chancellor for academic affairs, and thence to the dean of engineering.

Yet, the bottom line is that a unit responsible for distance education must report somewhere. Since presidents are busy people, the unit is usually found within one of the institution's operating units. And most would agree that, if it is a top management priority, the higher its reporting location within the organizational structure, the better. Where units report within organizations is often an indicator of support and importance to the mission of the college or university. Nearly half of the institutions (48 percent) responding to our 1994 survey said that functional responsibility for distance learning reported to the academic vice president/provost, with 32 percent reporting to the head of continuing education. The remaining 20 percent indicated that the program reported to their academic unit, department, school, or college.

Faculty members and administrators must work together in identifying and resolving the issues, policies, and biases that inhibit systemic use of distance

education in meeting academic goals. Regardless of the noble motivation, change is something we humans resist. Thus, going into a program of distance teaching and learning will evoke reactions from the participants in ways that are hard to rationalize. This is the point: many reactions or responses are not rational. But we should be prepared for them and ready to work through them. Lack of know-how, loss of control, and loss of privacy are grounds for educators' reluctance to embrace distance learning programs. Each institution will need to find its way through the change process to embrace the possibilities that the new teaching and learning paradigm will bring.

## Closing Thoughts

The new teaching and learning paradigm will develop in the midst of our current models. In many cases, the process will be almost seamless and transparent — following a gradual shift to active and collaborative learning, and increased communication between faculty and students and between students, and more active involvement of students with real-world complex problems.

The new teaching and learning paradigm will have the following characteristics:

- Most programs will be Web-centric with a Web site for every course. Learning will begin and end in a World Wide Web environment.
- Most programs will have a high proportion of interactivity among faculty and students, between students, and between students and other resources, including human experts.
- Most programs will be able to be taken in a variety of formats using a variety of technologies.
- Most programs will depend primarily on access to resources — human and material — via the network.
- Most students will provide their own computing resources and access to the Internet and the World Wide Web.
- Many programs will offer a choice of some residency events and synchronous videoconferencing.

We can accomplish the shift to this new paradigm most comfortably if we have a vision of what we are trying to create. With vision we will make wise decisions in our investment in terms of technology and in personnel — and in our buildings and program offerings. Without the vision, without the gradual accommodation, severe ruptures will occur. An analogy might be made to an earthquake. The changes that are coming will without doubt shift the very ground and foundations of our institutions. If we move with the shift as each step becomes more apparent, we will not experience a build-up of needs and discomfort. We will meet the new paradigm stronger, richer, and more able to meet the needs of society and fill our role.

Each institution has its strengths and weaknesses, and each institution will target future opportunities based on people's visions and energies and opportunities. The needs are great. If we work together and build appropriate alliances between sectors of the society and infrastructure, we will serve our people and supporters well.

# Endnotes

[1] U.S. Congress, "Linking for Learning," Office of Technology Assessment, cited in *Florida Distance Learning Report* (Tallahassee, Fla.: U.S. Department of Education, 1992), 7.

[2] Michael G. Dolence and Donald M. Norris, *Transforming Higher Education: A Vision for Learning in the 21st Century* (Ann Arbor, Mich.: Society for College and University Planning, 1995), 7.

[3] Stanley M. Davis and James W. Botkin, *The Monster Under the Bed: Business is Mastering the Opportunity of Knowledge for Profit* (New York: Simon and Schuster, 1994), 88.

[4] T. Russell, "Television's Indelible Impact on Distance Education: What we should have learned from comparative research," *Research in Distance Education* 3, no. 4 (1992): 2-4.

[5] Barry Willis, ed., *Distance Education: Strategies and Tools* (Englewood Cliffs, N.J.: Educational Technology Publications, 1994), 33-35; and Barry Willis, *Distance Education: A Practical Guide* (Englewood Cliffs, N.J.: Educational Technology Publications, 1993), 4.

[6] J. A. Curtis and J. M. Biedenbach, *Educational Telecommunication Delivery Systems* (Washington, D.C.: American Society for Engineering Education, 1979).

[7] *Distance Education Through Telecommunications* (Washington, D.C.: National University Continuing Education Association, 1988).

[8] The World Wide Web (also known as the Web, WWW, or W3) is a continually growing universe of network-accessible information located on a network of computers throughout the world. It is the information-age equivalent of the local library. The Web is accessible to anyone with a computer and access to the Internet, though some Web sites require passwords for security. The Web relies on a standards-based body of software, including a browser (or software interface), and a common set of protocols and conventions. Hypertext and multimedia techniques make it easy for anyone to use the Web and to create Web sites of their own. It is estimated that the Web is growing exponentially, and that any business or institution that does not currently have a Web site will. Many faculty are creating Web sites for every course they teach: the Web site becomes the new place from which to launch and deliver a course.

[9] William J. Brand, "Managing Videoconferencing Is Building Ubiquity, Cutting Costs, and Communicating Easily: Not Just Talking Heads," in *Grasping the Momentum of the Information Age: Proceedings of the 1992 CAUSE Annual Conference* (Boulder, Colo.: CAUSE, 1993). Available electronically at http://www.cause.org/information-resources/ir-library/abstracts/cnc9227.html

[10] Linda M. Harasim, *Online Education: Perspectives on a New Environment* (New York: Praeger Publishers, 1990).

[11] Arthur Armstrong and John Hagel III, "The Real Value of On-Line Communities," *Harvard Business Review*, May-June 1996, 135.

[12] Evelyn Spradley, "Assisting Adult Higher Education via Personal Computer: Technology & Distance Education," *CAUSE/EFFECT,* Spring 1993, 37-42.

[13] From Open University's *Plans for Change: The University's Strategic and Development Plan 1996-2005*, 1996, 10.

[14] The National Learning Infrastructure Initiative is a membership coalition of institutions and organizations sponsored by Educom. Educom's role is to serve as a catalyst, bringing together affected parties to create joint solutions to problems inhibiting the creation of a National Learning Infrastructure. The three goals of the NLII are to increase access, improve quality, and contain costs of higher education. For more information, see http://www.educom.edu/program/nlii/nliiHome.html

[15] Stephen L. Daigle and Patricia M. Cuocco, "Alternative Educational Delivery," in *Grasping the Momentum of the Information Age: Proceedings of the 1992 CAUSE Annual Conference* (Boulder, Colo.: CAUSE, 1993). Available online at http://www.cause.org/information-resources/ir-library/abstracts/cnc9238.html

[16] Robert C. Heterick, Jr., "The Four Horsemen," *Educom Review* 30 (July/August 1995), 60. Available online at http://www.educom.edu/web/pubs/review/reviewArticles/30460.html

[17] Jaroslav Pelikan, *The Idea of the University: A Reexamination* (New Haven, Conn.: Yale University Press, 1992), 41.

[18] Ibid., 182.

[19] Alan Kay, "The Best Way to Predict the Future Is to Invent It," *Xerox PARC Forum,* 23 September 1993.

[20] *The Giants of Philosophy: John Dewey* (Nashville, Tenn.: Knowledge Products, 1991), audiotape.

[21] John Dewey, *Experience and Education* (New York: Collier Books, 1938), 87.

[22] Harasim, in the foreword by Murray Turoff.

[23] Alfred Bork, "Computer Futures for Education," *Creative Computing* 10 (November 1984), 178.

[24] Willis, *Distance Education: Strategies and Tools,* 33-35.

[25] Co-author Boettcher was heavily involved in this project while she was managing a faculty support unit at Penn State from 1990 to 1995.

[26] Described by T. H. White in his novels *The Book of Merlin* (New York: Ace Books, 1987) and *The Once and Future King* (New York: G.P. Putnam's Sons, 1958).

[27] Thomas DeLoughry, "Mandatory Computers," *Chronicle of Higher Education*, 5 May 1995, A37.

[28] S. Johnstone, "Research on telecommunicated learning: Past, present, and future," *The Annals of the American Academy of Political Science* 514 (1991): 49-57.

[29] Goldie Blumenstyk, "Faculty Group Calls for Caution and Curbs on Distance Education," *Chronicle of Higher Education*, 26 January 1996, A20.

[30] James R. Mingle and Larry Gold, "Should Distance Learning Be Rationed?" *Educom Review* 31 (July/August 1996): 48-52. Available electronically at http://www.educom.edu/web/pubs/review/reviewArticles/31448.html

[31] Willis, *Distance Education: Strategies and Tools*, 286-287.

[32] See Polley A. McClure, John W. Smith, and Toby D. Sitko, *The Crisis in Information Technology Support: Has Our Current Model Reached Its Limit?* CAUSE Professional Paper Series, #16 (Boulder, Colo.: CAUSE, 1997).

[33] Willis, *Distance Education: Strategies and Tools*, 277.

[34] Ibid., 278.

[35] James W. Hall, "The Convergence of Means: The Revolution in Electronic Technology and the Modern University," *Educom Review* 30 (July/August 1995): 44. Available online at http://www.educom.edu/web/pubs/review/reviewArticles/30442.html

# Appendix A: E-Mail Survey Findings

In the fall of 1994, an informal electronic mail survey was conducted to gather institutional data and anecdotes that might indicate how distance learning is progressing at some colleges and universities. Under the auspices of CAUSE, Gene Sherron sent a six-question survey via the Internet to approximately 850 CAUSE "institutional representatives." These individuals were primarily information technology professionals working in central computing, telecommunications, and administrative offices on campus. The survey produced some 300 responses, a 35 percent response rate.

Over 55 percent of those responding to the e-mail survey (165 institutions) said that their campus was involved in distance learning. Of the 42 percent who indicated they did not have distance education programs, 49 percent said they had plans to offer courses through distance learning programs in the next three years. And of the institutions already offering such programs, 99 percent were planning to expand them in the next three years.

Library support is one of the most critical student support services provided in distance education programs. A follow-on e-mail survey to collect data related to library support was sent out in May 1995 to the 165 colleges and universities that initially responded that they were involved in distance education. About 36 percent responded.

Findings from these two e-mail surveys include:

- *Credit and Non-Credit Programs*

How many of the distance learning programs offered by the 165 institutions involved in distance education were credit as opposed to non-credit courses? The majority offered credit courses, but half were also offering non-credit programs. *NOTE:* Many of these non-credit programs are for Continuing Education Units or CEUs, which may or may not be degree-oriented but are often of critical importance to maintaining professional qualifications.

- *Courses and Enrollment Per Semester*

Another interesting aspect of these programs is that when colleges and universities get started in distance education, the programs often get to be fairly large. On average, the survey showed that campuses engaged in distance learning offered twenty-two courses each semester, with an average of 500+ students enrolled in distance ed courses each semester.

- *Common Delivery Methods*

The initial survey found that the predominant mode for delivery of distance education was two-way, interactive television (ITV), as reported by 120 campuses, with one-way TV a close second (reported by 98 colleges and universities). E-mail and correspondence courses rounded out the top four with about 75 responses each.

The colleges and universities involved in distance education reported using many methods to deliver the "signal." Nearly 130 out of the 160 respondents indicated that they used commercial circuits or land lines to transmit their programs, with 76 campuses reporting the use of fiber optic. While we cannot be sure if this represented fiber on the campus or the respondent's belief that most commercial circuits are using fiber at some point in the system, these two together constitute a single dominant medium. Sixty-seven campuses were using microwave transmission.

- *Tuition and Fees*

The perception of many administrators is that the student should bear the financial burden for being able to access education at remote sites. Yet 90 percent of the respondents said that distance education tuition fees were the same as or equal to those paid by on-campus students. Of those who said that they

were higher, the average represented an 11 percent increase.

- *Distance Learning Programs as Part of the Regular Academic Program*

For 52 percent of the campuses, distance learning was part of the institution's regular academic course offerings. A majority (61 percent) of the respondents said that their distance learning program had been in operation less than five years.

- *Library Services*

Very comparably to the earlier survey, 71 percent of the institutions contacted in the follow-up survey indicated that they provide library service to their distance education programs. Of those, 40 percent stated that they had established branch campus libraries specifically to support the distance learner's library and information needs. The majority of the library support had to come from the main library (49 percent) or branch libraries (40 percent) back on the flagship campus. A number of institutions made support agreements with community colleges, other universities, and private libraries which were closer to their distant learners. The 49 percent that provided support from the main campus specifically identified a librarian to assist those students.

The range of library and information services offered to distant students included

| | |
|---|---|
| reference | 92 percent |
| bibliographic instruction | 92 percent |
| inter-library loan | 89 percent |

Other services provided included access to the online catalog and use of an 800 telephone number for ease of contacting the main library.

Eighty percent of the responding institutions said they used electronic networks to help support the distant learner, including such features as e-mail (74 percent), word processing (46 percent), database software (37 percent), and spreadsheet software (34 percent). Thirty-four percent of the campuses gave the distant learner electronic access to services such as the main library's CD-ROM databases. Of those students given Internet access, 54 percent had full access and 34 percent limited access. The 22 percent of the respondents that did not provide Internet access noted in their survey comments that they had plans to do so.

# Appendix B: Planning Distance Learning at Florida State

As an example of the way in which one institution has worked through the changes inherent in adopting a new teaching and learning paradigm, this appendix outlines some of the Florida State University experience. It summarizes the vision and goals of FSU's interactive distance learning initiative and describes the initial strategies for design, development, and delivery of interactive distance learning courses.

Planning for distance learning at Florida State began in 1991 with the formation of a Distance Learning Council. That Council produced a comprehensive report and vision at the end of 1993 with the key recommendation of launching an office to serve as a focal point for distance learning — the Office of Distance Learning. The distance learning initiative gained momentum in mid 1995 with the establishment of that office, which soon changed its name to the Office of Interactive Distance Learning (IDL) to encourage design and implementation of distance learning programs that maximize intellectual interactions between faculty and students.

## Vision and Goals of Interactive Distance Learning at FSU

- Interactive distance learning will expand Florida citizens' access to higher education
- Interactive distance learning systems and principles will enrich and extend the best qualities of a higher education experience, including on-campus as well as remote or off-campus programs.
- Interactive distance learning will achieve these ends by wise and creative use of the full range of information technologies now transforming society.
- Interactive distance learning systems and techniques will be implemented over the next decade and will impact a wide spectrum of the Florida State University's academic functions, from the recruiting and admission processes, through the full teaching and learning experiences, to support systems such as student life and library information services.
- Interactive distance learning will be a tool to enhance the quality and facilitate the flexible delivery of higher education.

## Shared Vision of Interactive Distance Learning

Interactive distance learning is a powerful way to meet these objectives. The Council offers the following definition of interactive distance learning:

> Interactive distance learning is an educational philosophy for designing interactive, responsive, and valid information and learning opportunities to be delivered to learners at a time, place, and in appropriate forms convenient to the learners.

This philosophy of interactive distance learning assumes a mix of technologies based on an analysis of student needs, content requirements, and costs. It assumes a design based on a range of interactions between faculty and students, among students, and between the student and a broad array of media and

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Note: Portions of this summary are from the *White Paper on Interactive Distance Learning* adopted by the Distance Learning Council of Florida State University on April 18, 1996. The entire paper is available at http://idl.fsu.edu/info/info.html.

other learning resources, including current experts and real complex problems and internships. Designing with these dialogues as principles can help to ensure that the teaching and learning process is an active and collaborative one.

## Making the Change

Beginning the move to distance learning requires significant institutional change. One strategy is to establish a task force of highly influential, dedicated individuals with a period of planning to develop a shared vision. The development of a shared vision takes time, work, and consensus-building. It must include elements of a top-down communication process as well as the development of a grass roots movement from those who will be primarily responsible for changes in the teaching and learning paradigm — in this case, the faculty. The development of a shared vision in a university also must have its roots firmly planted in educational theory and practice. The Interactive Distance Learning initiative at Florida State has its educational roots in the experience-based and interactive theories of John Dewey as well as in Instructional Systems Design.

## Characteristics of Interactive Distance Learning — the ACCEL Model

The characteristics of the new teaching and learning paradigm will likely evolve rapidly over the next decade. For now, we can predict that some of its key characteristics will be as follows:

*Active.* Learners participate in a variety of new forms of learning that include thoughtful, engaged activity.

*Collaborative.* Interactive Distance Learning includes and facilitates discussion and exchange among students.

*Customized and accessible.* Interactive Distance Learning fits the needs and requirements of students in terms of time, career goals, levels of preparation, and learning styles.

*Excellent quality.* Courses are designed with a learner focus, enabling learners to achieve desired goals and objectives. This type of learning generally will include communication with faculty members and other students, and quick, easy access to high quality instructional resources.

*Lifestyle-fitted.* Interactive Distance Learning accommodates lives of students, affording cost-effective educational opportunities anywhere, anytime, and at a reasonable speed.

## Getting Started: Major Initiatives

The major initiatives recommended to begin this venture are the following:

- Strategic Planning and Needs Assessment Initiative
- Degree Program Initiative
- Faculty On-Line Initiative

The overarching principle for the change to distance learning is that the change will be institution-wide — creating a new university from a revitalized core. The goal is not a parallel or dual institutional distance learning university, but a new institution for the information age. The implementation strategy thus has elements of projects and institution-wide support.

### *Strategic Planning and Needs Assessment*

This initiative requires the continuous definition and improvement of Interactive Distance Learning objectives and systems. It will support the assessment of a quality program based on clearly defined priorities and comprehensive strategies and tactics.

### *Degree Program*

This initiative will launch a limited set of new IDL programs which will enable Florida State University to meet some immediate needs plus design and implement prototype models of the Interactive Distance Learning paradigm. For example, a number of master's degree programs are currently being delivered off-campus by faculty driving or flying to remote sites. An immediate goal is to redesign these degree programs for Interactive Distance Learning. A mix of technologies will be required to offer a high quality, useful learning experience, regardless of time or space differences, including videoconferencing, Internet/World Wide Web, multimedia resource materials, and technology-smart learning studios and spaces. Resources will be required for designing, developing, and delivering these courses. Additional resources needed for this new delivery model include instructional design and multimedia development ex-

pertise, delivery of degree programs, and marketing and positioning of these degree programs.

*Faculty On-Line*

This initiative is a University-wide strategy to empower and support all faculty members in the use of network information resources for instruction. It will include the provision of University-wide access to the Internet and the Web; personal computers; ClassNews, electronic bulletin boards, and the equivalent of electronic listservs; databases and servers; multimedia and programming tools; and support staff. This initiative is not unique to distance learning, but supports the University as a learning organization in the information age.

To accomplish these three initiatives, it is imperative that funding, support, and plans be adequate for their successful development and implementation. Partnerships and alliances at many levels will be fostered to assist with development and cost defrayment. Some potential partnerships and alliances will be public-private partnerships; some will be at local, regional, national, and global levels. More information about the master's degree programs and the other distance learning activities at Florida State University is available on the FSU Web site (see http://idl.fsu.edu).

Creating an appropriate learning environment and providing necessary support services will enable the University to implement a more responsive delivery environment for all students, on campus or off.

# Appendix C: Additional Resources

The speed of technical change, the diversity of ap-plications, and the absence of a profile of profes-sional qualifications to manage distance education programs are some of the major obstacles to keeping abreast of distance education trends. Along with references cited in the Endnotes, the following brief list offers a starting point.

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Tapscott, Don. *The Digital Economy: Promise and Peril in the Age of Networked Intelligence.* McGraw-Hill, 1996.

Tiffin, J., and L. Rajasingham. *In Search of the Virtual Class: Education in an Information Society.* New York: Routledge Publishers, 1995.

Witherspoon, John P. *Distance Education: A Planner's Casebook.* Boulder, Colo.: Western Interstate Commission for Higher Education, 1996.


### *Journals*

*American Journal of Distance Education* (Editor: Michael G. Moore), American Center for the Study of Distance Education, College of Education, The Pennsylvania State University, 403 South Allen Street, Suite 206, University Park, PA 16801-5202, 814-863-3764. See http://is04.ce.psu.edu/ACSDE/Jour.html

*Journal of Distance Education,* Canadian Association for Distance Education (CADE), 205-1 Stewart Street, Ottawa, Ontario, Canada, K1N 6H7. See http://www.cade-aced.ca/english/journal.html

*DEOSNEWS* (Distance Education Online Symposium), The Pennsylvania State University, College of Education, 403 South Allen Street, Suite 206, University Park, PA 16801-5202. See http://www.tapr.org/~ird/Stokes/general/deos.html

### *World Wide Web Resources*

American Center for the Study of Distance Education, Penn State. See http://www.cde.psu.edu or http://is04.ce.psu.edu/ACSDE/

Asynchronous Learning Networks — *Journal of Asynchronous Learning Networks* (JALN) and the *ALN Magazine.* See http://www.aln.org/

Distance Education Clearinghouse, University of Wisconsin. See http://www.uwex.edu/disted/home.html

Sloan Center for Asynchronous Learning Environments (SCALE), University of Illinois at Urbana-Champaign. See http://w3.scale.uiuc.edu/scale/

### *Personal Network Ideas*

Attend the annual conference on Distance Teaching and Learning at the University of Wisconsin at Madison, Madison Education Extension Programs, 159 Education Building, Madison, WI 53776-1385. See http://www.uwex.edu/disted/distanceconf/deconf.html

Join the National University Continuing Education Association, One DuPont Circle, Suite 615, Washington, DC 20036, 202-659-3130. See http://www.NUCEA.edu/

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## Privacy and the Handling of Student Information in the Electronic Networked Environments of Colleges and Universities

***A white paper developed by a CAUSE task force in cooperation with AACRAO***

As higher education moves steadily toward providing both education and student services in a networked environment, many privacy challenges occur with respect to handling student information. This paper offers a set of primary principles that underlie fair information practices and recommends a process whereby a full spectrum of campus constituencies can be involved in discussions that will lead to a better understanding of campus culture and values with regard to these principles. Included in the principles discussion are related issues that arise in a networked environment, as well as examples of practices that represent lesser and greater application of the principles. Many helpful appendices are included. *CAUSE; 1997; 52 pages*

*"There is a delicate balance between the responsibility for maintaining student privacy rights and the responsibility for providing effective and efficient service to students."*

from the Executive Summary

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