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The Web is a completely pervasive innovation that's revolutionized how we transmit information in exciting ways. How to pay for these changes and support them is a challenge.

—Jane Marcus, Stanford University

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The ACUTA Journal

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President’s Message

New Perspectives on Distance Ed

When thinking about the theme of this issue of the ACUTA Journal, I considered the impact that distance education has had on my family. When the 1929 stock market crashed, my mother was a senior in college. She returned home to help her family survive tough economic times, but was able to complete her teacher’s credential via correspondence courses. In the 1950s my father taught at the University of Wisconsin’s Management Institute, teaching extension courses throughout the far reaches of that state. In the 1970s my brother was in the Army overseas, but completed all coursework for an MBA from Pepperdine University from professors who were flown in to his base. And likewise, while working in Sacramento, I completed my MPA at the University of Southern California’s regional campus, without ever setting foot in southern California.

The reasons that students want education at a distance from the physical location of a college or university have been those of personal convenience, family and work obligations, and individual decisions. The reasons universities and colleges offer this type of educational experience can include meeting the mission of the school, market advantage, or extending consideration to the special needs of students.

The types of distance education that served my family so well are the traditional ways distance education has been presented: correspondence courses, extension programs, regional study centers, or professors physically going to the location where the students need them.

Today, the paradigm has changed dramatically. Technology allows higher education institutions to bring education anywhere in the world via the Web and audio and video conferencing, in dynamic as well as static formats. Classes can be taken at any location with professors from multiple campuses, regardless of time zones. Coursework can be enhanced with streaming media lectures, with live Web video, with real-time chat rooms. Students from one campus can work collaboratively with those in far-flung locations, sharing video, audio, and text images; making real-time changes to joint materials; and sharing ideas and learning in high-touch, high-involvement, highly creative ways.

High-tech classrooms bring the wealth of higher education either into or away from the physical location of the professorate. Wireless transmission can extend educational opportunities to the lawn or to the farthest off-road location with increasingly less expensive personal computers, dropping transmission costs and expanding satellite transport options.

None of these opportunities could exist without telecommunications. Without the technology ACUTA members support, maintain, plan, and deliver for their schools, we would still be in a world where distance education meant using the mails or physically transporting professors to where the students were. The meaning of campus has changed. And ACUTA members are an integral part of making that happen.
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Web Technologies @ RIT

by Diane Barbour, Michelle Cometa, Steven Good, and Joeann Humbert
Rochester Institute of Technology

“In 30 years, the Internet grew from a Cold War concept for communicating through the remains of a post-nuclear society to an Information Superhighway that ushered in a social and economic revolution. At 30 years old, no other invention had grown so fast to reach so many people.”

-American Decades, 1990-1999

RIT technology adoption began as a steady walk, increased to a spirited run, and has become an all-out sprint over the last several years. The campus network has grown exponentially, and the drivers of this growth have been issues faced by all academic institutions:

• Changes in the student population (decreases in 18 to 21 year-olds; increase in adult student interest)
• Rising operational costs that impact services on the campus
• Industry changes that impact universities by expecting graduates equipped for the workplace
• Student expectations and demands for specific technologies

How did RIT prepare for the inevitable changes, and how is it coping with the demands? From the beginning, RIT was a strong adopter of technology because of its emphasis on career education. Its role as a partner with industry—engineering, imaging arts, and information technology, in particular—made the synthesis of technology growth a normal and natural one. Despite this, there were the issues that all colleges face when adopting technology:

• Is the network infrastructure adequate?
• Are faculty development and training part of the integration plan?
• Will the technology improve student services?
• Is the staff able to support and facilitate the new services?
• Is there a technology plan that balances new technology with cost effectiveness?
• Most important, will new technology improve teaching and learning?

For the questions above, RIT can answer in the affirmative to many, or express that it is well on its way to answering these questions as of 2001.

Technology adoption is a standard and constantly improving facet of RIT as a career university. Online learning is a microcosm of that growth and one of several important drivers to adopting new and better technology for course delivery. Three points reflect the parallel paths of the college’s new direction and the growth of online learning:
1. There is a correlating growth of the online learning environment and the expansion of RIT uses of information technology and services (both on campus and at a distance).

2. For the overall development of new services, programs, and educational initiatives, there was strong financial and philosophical support for the adoption of technology on campus to move the university into a new phase of development, including the online learning environment.

3. Collaborative efforts among departments, administration, and individuals were instrumental in raising RIT to a new level of educational pedagogy across the university, especially with the incorporation of new technology, regardless of format.

By highlighting some specific online learning issues, we can see the impact of incorporating technology.

**Historical Perspective: Growth and Technology**

RIT is a private, four-year university, located in Rochester, New York. It enrolls 9,000 full-time, 2,300 part-time, and 2,200 graduate students. RIT has been involved in distance learning since 1979, when the College of Continuing Education (CCE) first offered courses to students over the local cable-TV station.

The first full degree program offerings were presented in 1990 and were funded in part by the Annenberg/CPB New Pathways program. This grant enabled the Distance Learning (DL) department to improve current offerings and develop additional programs in the asynchronous (“anytime, anywhere”) format.

In addition to the first asynchronous courses, RIT developed a site-based program for the K-12 community and for the college’s Electrical/Mechanical Engineering Technology (E/MET) program. Area high schools were connected to RIT using the telewriter, a combination computer, telephone, and whiteboard. High school students took RIT composition, economics, American history, and calculus courses for college credit.

For the E/MET site program, several community colleges in New York State and then General Motors sites in Michigan were connected also using the telewriter. The first-generation technology—videotaped lectures, telewriter, and U.S. mail—sufficed. Faculty connected “live” to all students at sites using...
the telewriter. They, in turn, were able to hear students at all connected sites during hour-long recitations one to two times per week.

Corresponding to the growth of the site and asynchronous formats was the growth of related campus services. The Educational Technology Center and its production staff were increased to maintain the videotape and telewriter technologies. Distance Learning as an organization grew and added support staff to provide outreach to students and work with faculty to present courses. This group was independent of CCE but still interrelated to this college; the college provided courses and academic advising while DL acted as the service provider for faculty and colleges.

A new demographic was emerging: part-time, adult professionals, in need of advanced degrees in a different time frame than on-campus day sessions or evening continuing education classes. In industry, advances in networking and telecommunications technology also influenced how instruction could be enhanced and how students should be prepared for careers in these emerging fields.

With all of this in mind, in 1997 RIT began a revision of its strategic plan to incorporate the potential of technology to meet multiple needs, including the following:

- Increase student populations and tuition/revenue-producing outlets
- Target a larger, more specific group of students requiring advanced career skills and degrees
- Increase the delivery options for faculty from primarily classroom lecture to distributed learning options
- Address accessibility issues to better serve under-represented populations and special learners
- Utilize technology in a thoughtful way to enhance teaching and learning regardless of medium.

Specifically, the goal was for DL to increase enrollment from 1.8 percent of total credit hours generated to 8 percent, or 38,000 credit hours.

With the rise of DL and the increase in students in the program, there was correlating demand for new and better student services, including access to campus services such as the library, registrar, admissions, bookstore, and other areas that on-campus students have the advantage of visiting as needed. Systems across the institute enhanced their services to include distance students. DL did not build "shadow" services, but worked with on-campus services to integrate current systems and processes to fit demands of a new and distant student population.

Current Thinking: Growth and Technology

Much has changed since 1997 both globally and at RIT. For example, about 30 percent of students who participate in online courses are not distance learners. They reside on campus.

The current philosophy for online learning at RIT is based on the following premises:

1. Future growth in distance learning (new program development and conversion of existing programs) for off-site students will be driven by identification of promising markets through Enrollment Management and Career Services (EMCS).

2. RIT will move away from the growth-driven, distance-learning, credit-hours-generated targets of the RIT Strategic Plan and the 1997 Distance Learning Task Force and move toward an entrepreneurial model based on niche opportunities as identified by EMCS.

3. The distinction between Distance Learning (DL) and Online Learning (OLL) will be one of degree, not of kind. Training, instructional design, faculty, and student support provided by OLL and its partner services will be applied along a continuum of course delivery techniques.

4. OLL Services will also play a significant research role in evaluating the effectiveness of various online methods.

5. In its support and research roles, OLL will work collaboratively with Wallace Memorial Library; Educational Technology Center; Institutional Research & Policy Studies; the Office of Grants, Contracts, and Intellectual Property; and the colleges.

6. Every effort will be made to develop all distance curricula into OLL formats, discontinuing first-generation distance delivery technologies.

7. Information and Technology Services (ITS) will provide the infrastructure and location for any and all learning platforms adopted by OLL.

8. All RIT faculty will be supported through OLL in developing online literacy for courseware.

These premises and a yet-to-be-announced new organizational structure will carry RIT forward through a new thrust of growth in the effective use of online technologies in the teaching and learning process.

In this new environment the provost will encourage all faculty to become literate in online technologies. As a minimum, syllabus, catalog, and information about the instructor should be available online. The RIT
Effective Teaching Committee has been asked to provide recommendations on an organizational structure to support online learning and distance learning. It will also begin to evaluate the effectiveness of online learning and distance learning. RIT has moved away from videotaped lectures on TV and individual tapes mailed to students. More and more courses are either completely or partially online. Distance-learning courses are expected to be available online 24/7 to support the “anywhere, anytime” learning expectation. Twenty percent of courses now use live audio conferencing or text chats. RIT has new and expanded course management systems to install and support.

The concept of a “smart” classroom—one equipped with computer, video, and Internet access—has been extended to include dorms, apartments, homes, and social gathering places. RIT’s wired campus is now also a wireless campus.

The Infrastructure: Staff, Equipment, Software, and Training

A totally online service environment requires an extensive technology infrastructure. For most colleges and universities this seamless infrastructure will require either sizeable information technology expenditures or new strategic partnerships that allow for these services.

In the last several years, ITS launched major initiatives to support the growing need for updated technology on campus. ITS was part of a growing trend on campus to collaborate with related and affected departments on extensive infrastructure projects to improve the overall network system.

A new PBX telecommunications system was installed, and the Academic Network Project included the addition of 20,000 new jack outlets, wiring, and associated equipment over the entire campus and residence halls. As new academic buildings and residence halls were built or renovated, they were wired for voice, data, and video. All were part of the growing need to accommodate new students and faculty and the support staff necessary to sustain the growth. The result is a network architecture that is designed to handle all forms of network traffic current and future.

Backbone Architecture

RIT’s backbone architecture consists of a layered dual star core router topology linked to dual server routers, external connection routers, and distribution routers.

The layered dual star network design provides high performance and fault tolerance. Star topology provides for efficient connections and is very cost effective. The star (like a wagon wheel) consists of a router or switch located in the center. The sole function is to provide connections between all of the other routers (spokes in a wheel). A layered star topology allows you to change network technology at each layer of the network topology, as customer and business demand warrants. The problem with a typical star topology is single point of failure. By implementing two systems at the star center, you solve the single point of failure and add bandwidth by providing an additional pathway from routers connected to each of the star centers or core routers.

An older approach that is no longer recommended and does not scale well in large networks is what is known as fully meshed. In a fully meshed network, each router would have a connection to every other router. While providing multiple paths for fault tolerance, a fully meshed network becomes quite expensive and presents problems associated with adding, changing, or removing routers.
There are two subnets used for wireless technology options. One supports the east side of campus while the other serves the west side.

**Customer Access**

Network customers can connect to the RIT network through permanent network outlets located in all buildings across the campus, including classrooms, offices, the library, meeting areas, residence halls, and apartments. Customers are required to register their computer on the RIT network. Once registered they can roam anywhere on the RIT campus and connect to a wired outlet. A limited number of wireless access locations have been installed and can also be accessed by registered customers. RIT currently supports approximately 16,000 active network connections, with a growth potential of 26,000 connections.

**External Connections to the RIT Network**

RIT has three Internet connections.

- Commodity Internet access (Internet 1) provided by Applied Theory over an OC3 (155 Mbps) connection. This is the main Internet connection.
- Research and Education Internet2 access provided by NYSERNet over an OC3 (155 Mbps) connection. The Internet2 connection with NYSERNet provides direct connections to other NYSERNet I2 members, along with connections to other National and International Research and Education Networks. Abilene and vBNS are two of the national research and education networks.
- RIT also has a T3 (45 Mbps) connection from Global Crossing. This connection is not yet deployed.

**Virtual Private Network**

RIT has implemented a VPN (virtual private network) service. This service provides for secure connections by customers when they are running RIT’s VPN client. With VPN services, many applications that were available while using the network on campus can now be used securely when coming in through Internet connections.

**Current and Future Challenges: Manage the Infrastructure**

The journey to more Web-based online learning is ongoing at RIT. Building the infrastructure was the easier part of an extensive technology plan for the University. RIT is continually improving and fine-tuning the management process for this critical campus resource that has been created. Faculty have become accustomed to using technological resources for instructional delivery. RIT is committed to
providing the most robust and relevant resources to meet educational needs.

These are some challenges and issues the University faces. Most have become campuswide discussions and will be the basis for collaborative efforts toward continued improvement.

- What network usage policies need to be adopted? Peer-to-peer is a wonderful technology but not when it interferes with teaching and learning as students use this technology to serve video clips and music for their friends.
- Traffic management tools can be used to analyze traffic patterns. What traffic management policies and procedures need to be adopted to create and preserve an optimum online learning environment?
- How should faculty frustrations be handled if the technology does not work? Should they be trained to be more technologically savvy, or should support staff be provided to assist them?
- How can network reliability be assured? How much redundancy is needed?
- How much and what kinds of security do we still need to protect critical network resources? RIT recently hired a security officer to develop security policies and procedures for its online environment.
- How important are standards in this new online environment?

Conclusion

The Web is still maturing as a technology and as a conduit for teaching and learning. By answering the questions above, and others like them yet to come, we believe we become a better organization, one that is able to provide the most current, emerging technologies; that welcomes collaboration across constituencies; and that balances technology applications with teaching and learning objectives.

This is very much a journey and not yet a destination.

Contributors to this article are from Information and Technology Services at RIT: Diane Barbour, chief information officer (dhbcio@rit.edu); Michele Cometa, staff consultant, telecommunications (mcometa@hotmail.com); Steven Good, systems programmer/network administrator (sngdco@rit.edu); and Joeann Humbert, acting director, Online Learning (jhumbe@firstclass.rit.edu).
Integrating the Arts and Sciences with IT at GMU

by Ed Janairo

Today’s information-based economy demands a workforce skilled in technology, but it is not only engineers and computer scientists that are needed. America’s managers, executives, teachers, and other professionals must also be skilled with databases, electronic collaboration and communication tools, spreadsheets, Web pages, and even geographic information systems. Certainly our colleges and universities must fashion graduates who can write, communicate, think critically, and think expansively, but they must also ensure that these graduates can effectively function in a high-tech world.

An award-winning program in George Mason University’s College of Arts and Sciences is doing exactly this. Thanks to the college’s Technology Across the Curriculum (TAC) program, arts and sciences majors are also becoming fluent in several core technology skill areas. The TAC program seamlessly integrates information technology skills into the arts and sciences curriculum and requires the proficient use of technology in the classroom. The primary goal of TAC,
which began in 1998, is to ensure that the university turns out broadly educated arts and sciences students who also possess several core technology skills (see TAC Goals in box). So successful has this program been that it received a 2001 EDUCAUSE Award for Systemic Progress in Teaching and Learning.

The list of targeted skill areas was developed through discussions and surveys of academicians. The program administrators also engaged in a dialogue with private sector executives soliciting their views on what is needed in today’s workforce. According to a recent article by the associate dean of Academic Affairs at GMU, Dee Ann Holisky, and the Executive Director of the Division of Instructional Technology Support Services (DoIT), Anne Scrivener Agee, both the academicians and the private sector professionals had similar views on the role of technology in an arts and sciences curriculum.

“A by-product of the dialogue with employers was a reaffirmation of the value of a liberal arts education in the workplace,” Holisky and Agee write. They also cite a study conducted by an Oracle Corporation manager that gives evidence to the practical value of a program like TAC. Holisky and Agee state that the study “reported that the highest performers at Oracle are liberal arts graduates with technology skills.”

Integrating Technology into the Curriculum

To ensure that students attain these skills, faculty members receive funding to develop syllabi that will integrate the use of technology into the curriculum in a programmatic fashion rather than an episodic one. That is, information technology tools and skills should be required as an integral part of the regular tasks and assignments of a course, and there should be planning for the development and integration of these skills across the curriculum. Technical skills themselves are not to be taught in the classroom, nor are they to be employed in a particular class without an understanding of how the development of this particular skill fits in with the overall goals of college and of TAC.

An example of such a course is one described on the TAC Web site, an advanced French composition course that requires students to use an interactive module to post compositions, comment on other students’ work, and hold discussions, all in French and all online. Web site creation and maintenance and online collaboration play a major role in the course. In this case, however, the instructor does not take time out of regular language instruction to teach technical skills, but rather assumes that the student is already able to employ these skills.

There are courses, however, that are essentially technical, and it is in these courses that students can gain greater levels of achievement in the core skill areas. Such a course, also highlighted on the TAC Web site, is one taken by government majors, “Technological Competency and Electronic Research,” taught by assistant professor Darrene Hackler. In this course, students download datasets and conduct statistical analysis of data to answer research questions. Research is conducted in large part on the Web, and then students must collaborate electronically and produce a mini-research project that includes a short multimedia presentation.

Dr. David Wong, a geography associate professor who has participated in TAC, recognizes the value of technology integration in College of Arts and Sciences courses. “IT skills are indispensable in learning and in research,” he says. Dr. Wong has also seen the effectiveness of TAC in his classroom. “In my case, it has been quite successful. Most students—more than 80 percent—come to my class with no or few IT skills,” says Wong. He reports that by the end of the class nearly all students attain a close familiarity with the
skills and nearly half attain a high degree of facility in his courses' IT skill areas.

Funding Technology in the Classroom

To assist faculty in restructuring their courses, they may apply for support of $500 to $4,000 for the development and implementation of their new technology-rich course curriculum. In the first two years, TAC granted approximately $450,000 for faculty proposals. During this time, more than 70 courses in 14 departments integrated technology into the classroom.

In the past, instructors may have independently employed technology, but their experiences were not regularly shared with others. Now TAC fosters coordination of technology use among faculty, within departments, and across the department. An instructor is able to consult TAC to determine which technology skills may not be as strongly promoted as others in the department’s course offerings and then work toward integrating that skill into his or her own syllabus.

To encourage further the coordinated integration of technology, faculty proposals for course development funds are evaluated so that collaborative and group proposals score more highly than proposals pertaining to single courses only. Department-wide proposals are given even greater consideration since the more programmatic a proposal is and the greater the number of students it will affect, the greater the return on what is often an expensive technology investment.

Support and Collaboration

As one might imagine, with a growing interest in information technology on the part of the College of Arts and Sciences at GMU, a considerable amount of technical support will have to be available for students and faculty. It is also no surprise that TAC has close ties with the University’s technical staff. In fact, TAC’s success is largely due to the high level of collaboration between the College of Arts and Sciences and the University’s Division of Instructional and Technology Support Services (DoIT).

The mission of DoIT, part of the University’s information technology unit, is to provide information, training, and facilities for faculty, students, and staff in order to promote greater excellence in learning and teaching. But the relation of DoIT to TAC is not simply one of technical support. Rather, the two departments are in constant communication with each other, setting goals and priorities together and sharing a common vision for the program.

As Agee says, “One of the unusual features of the TAC program and an important part of why it has been successful is that it is built on this collaborative relationship.”

Prior to TAC and DoIT, academic programs and technology programs rarely coordinated their efforts and neither side fully understood the expectations and goals of the other. Now academic leaders and IT leaders regularly discuss the needs of students and faculty, and information technology units are able not only to provide timely support for TAC but also to anticipate its needs. At least every other week, Agee meets with Holisky to plan for TAC’s progress. With this close partnership with the College of Arts and Sciences, DoIT was able to meet fully the needs of faculty involved with TAC, says Agee.

One major support effort for the TAC program has been the wiring of every classroom for network access. Also, with the frequent use of presentation software in coursework, classrooms now have zoned lighting so that students need not sit in the dark during a PowerPoint presentation.

“Smart” classrooms are equipped with a built-in computer projector, an instructor’s computer, and a control podium that enables multimedia presentations. Currently there are 30 such classrooms with plans for more. Also, there are several fully interactive classrooms with workstations for each student.

DoIT also provides other resources for faculty so that they can create a technology-rich classroom environment. The Instructional Resource Center (IRC), staffed by professionals in instructional design and student assistants, offers one-on-one technology training to faculty members. This close attention to faculty needs from IT staff is greatly appreciated, says Susan Warshauer, coordinator of TAC. She reports that they often “get glowing reports after workshops that are customized for our faculty.”

Another service that faculty find valuable is a commercial online course management tool, WebCT, provided by the IRC. It allows instructors to implement online quizzes, bulletin boards, asynchronous discussion, and collaborative presentation sites. In addition, DoIT has begun training talented graduate and undergraduate students in its Technology Assistants Program. These students are assigned to specific TAC projects and work closely with faculty on the projects’ development and execution. So the University’s IT folks not only provide the teachers with the hardware but with the people to support them throughout the semester.
Perhaps the greatest challenge for DoIT is eventually supporting the 15,000 undergraduates at George Mason University. "One of the most difficult tasks is planning to support all of these students," says Agee, "not just in terms of having equipment available but enabling them to learn about the technology applications." There are 20 computer labs on campus, but as TAC touches more and more students, a larger staff will be needed to provide application training.

Since the classroom is not the place for GMU’s students to learn technology skills, DoIT has developed the Student Technology Assistance and Resource Center (STAR).

STAR is unusual because it not only provides technical support for students but also is dedicated to training, mentoring, and closely assisting their work in technology. STAR trains and aids students with Web design and development, spreadsheets, databases, electronic presentations, and the other TAC skills areas. Currently STAR has six full-time staff and about 60 student mentors.

Collaborate to Succeed

George Mason University’s TAC Program has been tremendously successful as it continues to be embraced by more and more faculty members and students. Funded by the state as part of an initiative launched by Governor James Gilmore, TAC’s budget has grown since its inception, attesting to the program’s effectiveness. Certainly, however, the success of TAC is also largely due to the close relationship it has to the University’s information technology professionals.

Indeed, if there is one lesson to learn from George Mason University’s Technology Across the Curriculum program, it is that close collaboration between academics and IT staff ensures successful integration of technology into a curriculum. "If the IT unit is able to establish this collaborative relationship with the academic unit, it really makes everyone’s life easier. You can then point out the pitfalls and be ready for any future needs," says Agee. This mixture, then, of academic and technology professionals contains the necessary ingredients to create the technologically skilled and broadly educated graduate so needed in today’s workforce.

Ed Janairo is a freelance writer from Lexington, Kentucky.
The Impact of Distance Education on Academic Network Services: Collaboration is the Key to Success

by Dennie Templeton, PhD
Radford University

From its roots as targeted correspondence courses back in the 1840s, distance education—the delivery of information and instruction in a setting other than a lecture hall—has made dramatic advances recently due to the development of technologies that facilitate delivery. With the changing student population demographics, increased competition for educational dollars, and an emphasis on lifelong education, concerns related to distance education are top priority on campuses around the world.

Strategically, distance-education technologies have been viewed at many academic institutions as a separate arm to provide educational programming to extended campus locations. On many smaller campuses the role of a distance-education coordinator has been considered a secondary or collateral duty. In many instances, distance education (DE) and information technology (IT) planners work independently on equipment needs, technology assessments, and most significantly, strategic planning of resources. The impact distance-education technologies have on network services is often tied to the level of awareness of what IT and DE are thinking, planning, or implementing on campus. On many campuses, the necessity of a collaborative approach to strategic planning is just now being realized.

Distance Ed Past and Present

The dominant distance-education technologies in the last 30 years have consisted of satellite, videoconferencing, television, video, and print-based instructional delivery methods. Over the past 10 years, new technologies have created a revolution of information and opportunities for educational content delivery. With the evolution of computers and communications portals, technology has been not only a catalyst of change, it has been, in some instances, the
driving force. Networking, computers, and technology, including distance-education technologies, have now become a familiar part of the academic landscape.

In 1998 the International Data Corporation collected data from which it subsequently compiled a report that echoed the concerns of IT administrators regarding the growth of distance education and its continued demand on IT services. Recent research reflects that the numbers are even higher than projected. Comparing the numbers, we can make the following projections:

- The number of college students enrolled in distance-education courses will reach 2.2 million in 2002, up from 710,000 in 1998.
- By 2002, more than 85 percent of two-year colleges will be offering distance-learning courses, up from 58 percent in 1998.
- 84 percent of four-year colleges will be offering distance-learning courses in 2002, up from 62 percent in 1998.
- By 2002, the number of students taking distance-learning courses will represent 15 percent of all higher education students, up from 5 percent in 1998.

The report reflected a concern that most IT departments have about how to keep up with the rising demand from distance education technologies on IT services. Technological advances have also created an environment of indecision among distance educators and institutional network administrators about what instructional technologies to deploy.

Leading-edge distance-education technologies that impact IT network services and support include video conferencing, Web-based instruction, and Internet2. 

**Video Conferencing**

Teleconferencing has been a part of the educational landscape for many years, but it requires a substantial financial commitment on the part of educational institutions and a dedicated ATM or ISDN network portal between educational institutions and extended sites.

Videoconferencing can provide a quality 30-frames-per-second video picture that incorporates two-way interactive video, audio, and multimedia for a wide array of real-time instructional applications.

Two-way interactive technologies...
provide the closest simulation of a face-to-face classroom experience. Many institutions become partners in a statewide network delivery system such as NetWork Virginia, managed by Virginia Tech. Within this network, universities, community colleges, and K-12 institutions become collaborative partners with a host institution. Connections made outside the network can be facilitated through bridging and adaptive ISDN links.

**Web-based Instruction**

Web-based instruction is the hot topic in distance education and network services. According to the U.S. Department of Education, more than 100 new college courses go online each month, and more than 750,000 students access 26,000+ online courses ranging from general education courses to law degree curriculum. Through Web instructional development tools, such as BlackBoard and WebCT, educational institutions can move the traditional curriculum to distance learners anywhere there is Internet access.

As technological advances are made, technology and support options available to institutions increase. Colleges can also use Web development and host sites such as eSocrates that provide a way to implement Web instruction and technical support with little impact on campus network resources. The decision paths for either hosting or outsourcing rely heavily on the cost versus the ability of the organization to support an on-campus instructional modality.

One of the most frequently mentioned negative comments encountered in Web-based instruction is the lack of access to real-time video delivered to a PC or laboratory workstation. Real-time instruction to individual PCs in the future will have expanded access through high-speed bandwidth cable modems and ISDN telephone lines that will accelerate the growth of video-streaming courses and programs. Cornell University currently uses video streaming for medical lectures and procedures that are accessible through any Internet connection in the world. With the financial and resource backing of the Internet2 initiatives, soon high-speed Internet two-way videoconferencing for educational lectures and media will be as common as nonvideo Web instruction and audio streaming are today.

Where some forms of distance-education technologies such as videoconferencing and videotaped instruction have limitations, Web-based instruction can provide 24/7 access through network portals. Information to support the learning process using the Web is more accessible every day. The concern that must be addressed is how the increased demands for Web-based instruction and applications will impact network services and the institution infrastructure.

**Internet2**

Internet2 is a strategic effort by business, industry, and more than 130 educational institutions to develop and deploy advanced network and Internet technology applications vital to both business and educational paradigms. Internet2 provides a high bandwidth portal that brings television-type video quality to a standard PC. This will accelerate the need for DE and IT departments to expand and collaborate in implementing high-end Internet technologies.

When fully implemented, Internet2 will provide a conduit for many of the advanced distance-education technology applications of the future. Through its integration with the IT side, both DE and IT areas will work together on shared applications. The only question is when will the advanced applications be implemented? With the recent economic downturn and academic budget crunch, the "light at the end of the tunnel" often promised by Internet2 researchers may seem a little dimmer and more distant than before.

**Additional Concerns**

Over the last several years IT departments have also seen resources drained through student use of Napster and other similar file-downloading software. This year many universities are noting that students are downloading not only audio files but also video files, causing tremendous drains on network and instruction bandwidth. Some campus networks drop to a snail’s pace, affecting the quality and delivery of distance education courses through local IP, ISDN, or ATM portals.

**IT and DE Collaboration in the Real World**

In the classic tale Alice in Wonderland, Alice asks, “Would you tell me, please, which way I ought to go from here?” The Cheshire Cat responds, “That depends a good deal on where you want to get to.”

In dealing with network and distance-education technology issues, many IT and DE professionals feel as if they are tumbling with Alice down the technological hole. Ask an educational administrator about strategic planning, and his first thought may be of a binder that sits in the bookcase that was,
five years ago, a well-conceived document on how to move a department or segment of the college forward.

Strategic planning can be defined in many ways; but according to Barry Willis in Distance Education Strategies and Tools (Educational Technology Publications, 1994), "Strategic planning for distance learning represents a significant challenge to an educational institution, as it requires the expansion of thinking and operational planning beyond that of a traditional classroom and curriculum model."

This is applicable to IT planning in that it also requires that distance educators be aware of the impact of and need for combined strategic planning with IT and network administrators in the allocation of resources and personnel.

In today's campus environment where network services and distance technology are thoroughly interwoven, it is difficult to develop effective strategic plans based on the old strategic planning principles and guidelines. Procurement and application of instructional and distance technologies by network services and distance education departments usually have different coordinators and directors who have specific agendas to promote. In many instances they do not talk with each other in the strategic planning process and, as a result, one hand doesn't know what the other hand is doing.

One of the most important outcomes in setting up a technology strategic-planning process is for all of the affected departments of a college or university to come together as a united front. This accomplishes one major goal: It allows the technology players, such as network services, distance education, technology support, technical help desk, professional development and technology training, at the very least, to compare planning notes.

**Staffing and Resource Planning**

The U.S. Department of Commerce estimates that between 1996 and 2006, more than 1.3 million new IT workers will be required to meet expected professional demands. How is this going to affect academic IT departments, which have always had problems funding positions and competing with the business sector for technical personnel? That trend will more than likely get worse before it gets better.

Technical staffing for distance-education classrooms and Web-
Based instruction is often handled through IT support departments. One of the facets that is overlooked in the impact of distance education on network and IT resources is that many institutions have shared technical staffing for distance education and network maintenance and repair. Technical staff is often not only tasked with maintaining the technology and equipment but, at times, must interact directly with faculty. Anyone who has dealt with a faculty member or instructor who is teaching a videoconferencing course when the network link drops remembers that this is not a pleasant scenario. As technology expands and technical personnel are more difficult to find and keep, it will be essential for DE and IT departments to try to provide professional-development classes and workshops for technical support personnel, teaching them how to work with students and faculty—skills essential in any academic environment. This is a function of collaborative strategic planning.

**Identifying Objectives**

In assessing the impact of distance education on IT services, what are the most problematic issues? Through collaborative efforts IT and DE departments can work together on a planning process that will address not only the needs of the departments but the mission of the institution as well. Identification of broad combined objectives may include the following:

- What are the objectives of DE and IT independently and collaboratively as a component of the institution's academic program?
- Do the objectives support the university’s values and strengths?
- What instructional technologies are required to support the objectives?
- What instructional modalities and pedagogical models are appropriate for the technologies?
- What technical training will be needed for the technical support team?
- What professional development training will be required for faculty?
- What institution administrative plan will need to be addressed, reflecting the collaborative efforts of the combined departments?

Under these areas there exist a myriad of subobjectives depending on the educational organization, mission, size of the IT and DE structure, and the relative interaction between departments.

**Action Plans**

Achieving these broad objectives will require identified action plans that function as a checklist of events and actions to meet the stated objectives. They will provide two things:

1. A listing of what the IT and DE departments will be doing together to address both DE and IT issues.
2. A checklist of activities and collaborative actions that provide a way for both departments not only to track the progress of the stated objectives, but to work together to identify, modify, or correct any objective focus that may change.

The action plans can also provide information regarding how the implemented actions are working and if they are being completed on time. All of this data can be used to assess how each department is doing, both independently and as a collaborative unit. As objectives change, each department plan can be modified to meet a new action plan focus.

Through collaborative efforts between the DE and IT departments and parallel planning with the technology procurement arm of the institution, the goals, objectives, and actions can be better served under an “umbrella” planning model. Addressing these key questions in a collaborative strategic plan ensures that the technologies and support needs for distance education are not driving the IT planning model or vice versa.

**Final Thoughts**

The collaborative objectives and action plans described in the preceding paragraphs provide only the groundwork for the extensive planning required to meet the needs of DE and IT planning partnerships. There is also a growing need for distance education and network services to collaborate in the design, development, and maintenance of academic technologies.

Sometimes the working relationship between IT and DE departments can be compared to that of the political system. Each department needs to take a bipartisan approach to working together. In many instances, when the dust clears and the problems are identified, DE and IT staffs will find that they have more in common than they realized. When departments work together the combined efforts can provide a unified base for collaborative management of the impact of distance-education technologies on network services and personnel.

Dr. Dennie Templeton, director of distance education at Radford University, can be reached at dtemplet@radford.edu.
We invited a panel of experts from four campuses to a roundtable discussion of our focus for this issue, “The Impact of the Web on the Classroom, Faculty, and Instructional Delivery.” Publications Committee member Walt Magnussen, from Texas A & M, served as moderator for our panel.

Walt Magnussen: To begin our discussion, each participant will describe an exemplary project on their campus that demonstrates our theme, “The Impact of the Web on the Classroom, Faculty, and Instructional Delivery.”

Tom Every: There are many examples of Web sites which include sounds, images, simulations, and text to enhance learning by enabling students to learn concepts from different perspectives. You can see examples at www.cit.cornell.edu/atc/materials/GS/ideasweb teach/coursesite2.shtml.

One unique project which uses a Web site as a central connecting point to bring other universities together for a shared learning experience is the Global Seminar Program (www.cals.cornell.edu/global/). People from universities at five or six sites around the world work together creating problem-solving groups to work on food systems and environmental issues. The Web site is the central focus for a variety of things including videoconferencing, videostreaming, notes, and case study materials.

Jay Fern: A very important older example is one that actually started our Online Learning Initiative at IU. In 1998, one of the professors put up a Chemistry 101 course as a means of reaching students who had difficulty making
it to the large lecture class. We took a made-for-TV course and, using streaming video and push technol-
yogy for supporting materials such as images, enabled students to watch the lectures from home, incorpo-
ating lessons and experiments. Experiments were conducted via a kit purchased from the bookstore
that used household chemicals to do labs in the kitchen. Thus the beginning of our e-learning tool,
Oncourse (http://portfolio.iu.edu/jfern/
oncourseredir.htm).

Another project, which is a small piece of a
recently received digital-music library grant, explores
different procedures required to deliver audio over
the Web. It addresses copyright issues and the
complexities of authenticated access to the materials.
Learn more about the project at http://
dml.indiana.edu/oncourse/index.html.

Serge Goldstein: At Princeton we adopted a
standard course Web site tool. Among other things, it
enables students to come in and look through
available course offerings including syllabuses and
course descriptions. It has also enabled us to develop
a portal where students could quickly see all the
announcements or tasks associated with their
courses. So from an administrative perspective it
really empowers students and faculty to get course
information out.

Another project is similar to what others are
doing. We received a small grant to put up a video
server, and we have started putting up high-band-
width video—MPEG 2, not so much streaming video
but higher bandwidth materials—for courses in film.
Faculty are starting to use this video server for
teaching in the classroom as well as assigning viewing
to the students from cluster facilities around campus.
And it is beginning to have an impact on the way
students look at film, the ability to replay portions of
the film, even to embed snippets of the film into
papers they are writing. It makes video a media that
can be manipulated in a much more flexible fashion
by faculty and students.

Pierce Cantrell: We’re doing a number of similar
things at A & M. The College of Engineering has
been a participant in one of the education coalition
programs called the Foundation Coalition, which was
started in 1994. Technology-enabled classrooms are
an important part of that, and the college has now
renovated nine classrooms so that laptops are shared
between two students; and AC power and network
connection, as well as standard kinds of computer
classroom amenities, are provided. Over the years
people have added in-class exercises where students
work in teams. I think this has been quite effective.

Magnussen: Looking at the realities of costs as well
as human nature, will the centuries-old pattern of
lecturing to students still dominate the classroom 10
years from now?

Goldstein: In a word, yes. People have been predict-
ing the demise of the lecture for about 2,000 years.
Certainly people are talking about it now because so
much attention is focused on the learner-centered
classroom and getting the sage off the stage.

I don’t think this is so much a technology issue as
a human nature issue. The fact is that a lot of faculty
like to lecture and a lot of students like to listen to
lecture. A great lecture is a great performance. And I
think that people go to lectures for the same reason,
in essence, that they go to Broadway shows. It’s a
live performance hearing someone deeply knowl-
gedgeable on the subject.

Not all lecturers are great lecturers, obviously,
and I think that over time we will see the interactive
components of education come more to the fore, but
I think there will always be this core notion of
conveying not just information but interest and
excitement about a topic and knowledge that stays, if
not completely dominant, at least a very important
component of education.

What will change, though, are the delivery
mechanisms. People are now recording and filming
lectures to make them available over the Web. I
think there will be more of that, and I think that we’ll
see lecture snippets integrated with other compo-
nents. But I believe that the lecture will continue to
be a very important component for cost reasons as
well as human nature reasons. It is absolutely very
cost effective.

Fern: I think the lecture will continue to be strong
because students want to rub elbows with someone
who has spent their entire academic career studying
a particular discipline. The realities of being able to
enjoy that “performance,” as Serge said, and a
student’s ability to learn from a lecturer who can
hold his audience and apply a human touch is solid.
This is one of the principles that drives the whole
concept of tenure and how tenure is processed. It’s
designed to develop a faculty’s portfolio around
research and teaching in a particular subject. So
unless there is a radical change in the way tenure is
assessed, I don’t see the lecture going away.

**Every**: Serge mentioned going to see a Broadway show. Students are coming to expect something almost of an entertainment aspect—much more in the way of audiovisual materials to present ideas. I think that will be a significant part of the future as it supplements the standard lecture material.

**Magnussen**: What tenure process video, audio, student "by" with technology professors in an Ethernet Every: tion, engage new able professors. As going because Fern: I is areas. There are some student learning. to believe many professors. As new faculty come into the fold with technology experience, we’re going to see a new focus on a balance between reaching the “new student” by using multimedia technology such as video, audio, and active learning strategies that engage students, and building a portfolio that the tenure process drives.

**Magnussen**: What is state-of-the-art technology in the classroom today? What are some of the best practices for developing content, delivering instruction, and rewarding faculty?

**Every**: We are now pressing beyond the basics of having a data/video projector, VCR, overhead, and an Ethernet port for instructor presentations available in rooms. The technologies that enable students and professors to interact, collaborate, and visually demonstrate concepts are what’s hot today.

In the data communications area, wireless networking is now becoming more prevalent. I believe many institutions have experimental projects to assess how wireless can be used to enhance student learning. With every new lecture hall or electronic classroom that is renovated or built, the question comes up: Do we want network connectivity to every seat or should we plan on wireless?

I would say that the use of audiovisual materials to supplement standard lecture notes and increased usage of audio-visual and videoconferencing systems to enable collaboration between instructors and students are hot right now.

I usually break that down into two areas: One of those is one-way delivery where instructors are using CD-ROMs and videostreaming to supplement their regular lecture notes with visually oriented examples of ideas. The other is interactivity where videoconferencing enables team-teaching and student collaboration on projects, including virtual work-group activity involving multiple universities. An example of this is Cornell’s Global Seminar Program, which utilizes both room and desktop videoconferencing systems to create international problem-solving groups working on food systems and environmental issues.

The specifics of best practices are more difficult to pinpoint. I see just a lot of experimentation with technology going on and finding unique ways to encourage faculty, including grants and technology assistantships.

**Goldstein**: In the area of providing technology to the instructor, I think a lot of progress has been made. The area of providing technology to the students is considerably more controversial. I’m sure many of our readers will have read the stories about the...
business schools that are adding the Internet kill switches to keep students from spending class time surfing the Web. The technologies that allow students to get on the Web during class time pose some serious problems for faculty in terms of managing classroom activity. It's very hard to hold students' attention in that environment.

As we move toward technologies that involve students and the student/instructor interaction as opposed to one-way technologies where an instructor is showing a video or showing slides, we're getting into an area that is controversial and complex. I think new models are going to have to emerge on how to manage this and the impact on educational process.

Cantrell: This NSF project in engineering discovered that early on, and instructors handle that in different ways. One way is just to tell people to put their screens down, and people regularly do that in class. It's not the kind of thing you can do at a conference but it works fine in the classroom.

Fern: It's interesting that we're talking about this when the consensus is that the lecture is going to dominate for the next 10 years. This is a totally different paradigm from lecture. As we are deploying wireless, we are considering how folks in the classroom will be developing small-group, active-learning activities and other classroom techniques using technology to enable those strategies. We're deploying wireless in a number of places and beginning to see a rise of faculty interest for developing those methodologies, even though they may be experimental. It really is an issue that represents a shift in paradigm for the way faculty teach. When we talk about adding this type of technology, we need to ask the question: What does it mean for teaching and learning?

Magnussen: The high-tech classroom of the future could involve wireless, two-way videoconferencing, projectors, etc., and how many of these classrooms get to the point where costs run up to $100,000 to outfit? Are things like high-end, high-tech classrooms widening the gap between the haves and the have-nots?

Cantrell: If you just look at Internet2 on the surface, you might say yes, it is. It's a club that started out relatively small; but if you look more closely at it, Internet2 membership, Abilene membership, is now over 190. There are many kinds of regional universities that are going on, and I think the ability to connect is only going to increase.

In addition, we've got sponsor participants that allow us to work with other smaller universities or K-12 if we're doing a research project and bring them on, and then a number of states have connected their statewide networks onto Abilene. So I don't think there's as much of a gap there as some people would claim.

Now the issue is how many applications do we really have besides peer-to-peer sharing that are making effective use of Abilene? Today that number is probably pretty small. On our campus the best applications that I've seen have been two-way H.323 videoconferencing that has allowed us to bring in seminar speakers that we couldn't have done otherwise for some of the classes, and then just teaching classes. We had a class last semester in satellite design that was taught by someone from Taiwan. The interconnection was through the Taiwanese TANet then into Abilene.

Goldstein: We have a 145 Mbps pipe into I2, and we're lucky if, at any given time, 5 percent of that bandwidth is in use. And a lot of that is USEnet user needs and things of that nature. I think there aren't necessarily haves and have-nots because there isn't really a killer app out there that's driving this use. There are exceptions, I know. Our astronomy department, for example, will occasionally use the connectivity to download huge amounts of data from telescopes. And we're starting to see videoconferencing using IP use up some of that bandwidth, although most videoconferences are still running at about 768 Kbps, which is just a tiny portion of an I2 pipe. But there isn't that overwhelming usage yet which I think would create an environment where you say there are some people who aren't on the pipe who desperately need to be on the pipe. Maybe there are others who are using it more than we are. We're still kind of groping for that great application that will somehow soak up all of that bandwidth.

Magnussen: If more of the teaching becomes more dependent on the technology, what's that going to do to the haves versus the have-nots? Obviously there are a lot of significant direct and indirect costs involved in buying and supporting technology.

Fern: I agree, we don't have that many killer apps out there that are using I2. I think, though, that the whole perspective on I2 is based on the nature of research, which requires a limited number of universities or entities that actively develop those applications before they are released to the masses.
Goldstein: The core classroom technologies today, I think, are within the budgetary capabilities of most even smaller institutions. It’s not been my experience that the larger institutions are particularly in the lead in terms of classroom technology. In the state of New Jersey, I see some of the smaller institutions, even some of the community colleges, very often have grants or will develop capabilities in this area that are on a par or even leading larger institutions like Princeton. So I don’t really see that happening.

Cantrell: I agree with that. In fact, trying to refresh a school that’s really big like we are—something like 222 classrooms—is a really expensive process. We have only had in place a year now a student fee directed toward instructional technology and improvements to the classroom, so I see a lot of smaller schools that do a better job of that than we do.

Every: I agree with that also. I’m aware of some community colleges in upstate New York that are doing some things with wireless and other things in the classroom, and they cover a higher percentage of the classrooms than we come close to at this point.

Magnussen: For IT, networking, and telecom staff, what are the implications of the increased use of the Web in teaching? What do the best practices and trends tell us, and where are the changes taking us?

Cantrell: Clearly there are continuing networking and infrastructure issues where we keep having to build bandwidth. There are also the issues of 24/7 operations and reliability for Web servers. If you’ve got people dealing with class information, you’ve got to treat those just like you’ve treated the administrative systems in the past. That’s really changed the way we view supporting the infrastructure.

Serge: I absolutely agree with that. That’s the sea change that’s taken place. Teaching is really becoming dependent on IT. It used to be that only the administrative portions of the university were really dependent. If your IT systems went down, maybe you didn’t get the paychecks out, but a faculty member could teach. As faculty become dependent on IT for teaching, it completely changes the environment for IT professionals. Our Web servers, our course Web site servers, are now critical 24/7 components of the infrastructure, and many of our staff are not used to thinking in terms of 24/7 production level capabilities. So it’s required a bit of a reeducation and a reorientation to handle this change.

Fern: Support has always been and continues to be a big push for us, particularly at the individual customer level. Like most universities, we have people at all hours of the night managing our systems, and demand is increasing to answer support-related questions during that time. Our e-learning tool has a daily window to upload the registrar data at a time that impacts the least amount of people. Even though the lowest usage is between 5:00 and 6:00 a.m., we still have folks who want to access the tool at that time from Germany, Asia, and other places as well as locally. So we’re beginning to see a 24/7 mindset for support.

Magnussen: To sum up our discussion, we are seeing new technologies enable new methodologies, but don’t anticipate the end of the lecture. There is potential for exciting changes in higher ed as video-conferencing, audio/video streaming, and more interactive learning become the norm. And the message for the telecom professional as well as for faculty may be “collaborate to survive.”

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Molly Corbett Broad has served as president of the 16-campus University of North Carolina since July 1997. The oldest public university in America, the University enrolls 163,000 students and encompasses all of the state's public institutions that grant baccalaureate degrees, along with affiliated enterprises that advance the mission of the University. President Broad currently serves as president for the International Council for Distance Education and chairs the Internet2 Board of Trustees. She holds seats on a number of boards and executive committees, including the National Association of State Universities and Land-Grant Colleges (where she has been named 2001 chair of the Commission on Information Technologies).

James S. Cross, Ph.D., Vice Provost of Information Technology at Michigan Technological University, is a former ACUTA president who now chairs ACUTA's publications committee.

Dr. James S. Cross: As a result of the strategic importance of campus networks to teaching, learning, and research, and the dramatic increase in Internet attacks, what advice do you offer to presidents, provosts, and other senior leaders struggling with the complexities and costs inherent with providing a robust and secure campus network? How can academic leaders be involved in this deliberation process and other technology strategic planning initiatives on campus?

President Molly Broad: Academic leaders know very well that information technology and network connectivity are essential to all parts of our mission—instruction, research, and public service. While many campuses are still struggling to ensure fundamental connectivity for faculty and for students and staff, all of higher education is certainly challenged to augment the basic resources with security—sophisticated security, and monitoring systems that are necessary for effective administration of the network. I believe academic leaders must participate in a risk assessment and in evaluations of their campus network's vulnerability in order to make informed decisions about funding and where to place their investment in information technology.

Cross: As a result of the impact of the Web and the network on the classroom, content development, and instructional delivery, what emerging trends do you believe will have the biggest impact on UNC and other campuses? What sort of innovative applications is your institution currently exploring for using the Web to support—whether that be teaching, planning, research, or public service?

Broad: Jim, one of those emerging trends is wireless technology, which is developing as an increasingly important component of our infrastructure. The role of wireless devices in teaching and learning is receiving a great deal of attention across every single campus of the University of North Carolina. In fact, all of our 16 campuses have implementation plans for wireless networking, and pilots for using PDAs and other kinds of wireless technologies in the classroom are underway on 10 of our 16 campuses.

We are also exploring the uses of digital television as components of the array of delivery solutions for instruction. The University of North
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“There is an easier road.”
How Faculty Are Using Technology to Improve Teaching and Learning at UNC

- One faculty member uses active-learning pedagogy (i.e. cooperative learning) in conjunction with computer-based problem sets that allow small groups of students to work toward conceptual solutions to visually-based physics problems. Students who have completed this course perform on nationally normed exams approximately 20 points higher than the national average.
- Two professors (chemistry, genetics) are working toward using “Palm Pilot” technology, assigning problems to students who can quickly discover whether they really understand the content.
- A natural resources professor is developing a “library of assistance” for his Web-based classes with “viewlets” which provide students with visual-based information on demand.
- A professor has digitized an extensive collection of slides on wood anatomy and physiology, allowing students to review the slides at their own pace and to more easily compare similar woods so they can learn to discriminate between different species.

The Teaching and Learning with Technology Collaborative, along with the directors of teaching and learning centers on UNC campuses, are important forces in assisting faculty members in articulating both their goals and the results of their efforts in incorporating technology into research, service and, especially, teaching.

Carolina has as a component part the eleven-station network of public television, which we are well along in digitizing. Internet traffic and use continue to grow, at least doubling annually, and Internet technology is becoming steadily more fundamental to our activities.

The fact that the Internet bubble has burst presents us, however, with a number of challenges, one of which is the lack of private sector funding for exploring and deploying what we believe are rapidly emerging opportunities.

Cross: What are your views on the strategic importance of broadband technologies, whether they be wireless or wire technologies?

What will be the impact of these technologies in the future as they relate to research, public service, and instructional delivery?

Broad: Bandwidth requirements, in my opinion, will continue to grow and therefore will have an increasing impact on instruction and on research. Initiatives such as Internet2 and the emerging K-20 state networks (which are growing very rapidly), grid technologies, and advanced networking services can be expected to provide reliable and even more affordable means for faculty and students to teach and learn as well as to conduct research. So, I believe the expansion of bandwidth availability will be met with increased opportunity for its use.

At a university like the University of North Carolina where we have a number of very diverse campuses, the uses of bandwidth will be quite different from one campus to another. We have large research universities, a small liberal arts institution, a school of the arts, a school of science and math, historically black institutions, and a number of important comprehensive universities. It is vital that the learning and research occurring across the system be responsive to the unique and special needs of each of these constituent parts of the university. So there are great differences among our campuses in the uses of bandwidth.

The University of North Carolina is working to expand participation in research and to bring bandwidth-intensive content into our classroom, making it accessible on the Web. This, I think, is central to efforts to maintain the quality of our instruction and to support the technology transfer activities on the campuses of UNC.

I want to go on to say something more about Internet2, if I may. Let me start by saying how important it is that the National Science Foundation (NSF) is now providing leadership that will promote what they call their cyber infrastructure vision as a whole new way of conducting scientific research using virtual laboratories and instruments that are networked together, creating opportunities to assemble data and other resources widely and distributing that in ways that could not have been done before. The NSF Terascale Project is going to provide important new capabilities for broad access and the update recently announced by Internet2 of the Abilene Network into dense wave division multiplex-
ing is yet another example of important expansions in bandwidth.

I think increasingly we must acknowledge that modern science and research uses information technology and advanced networking as the fundamental scaffolding on which it is conducted—is built. Our visions about what is possible, given emerging bandwidth, are likely to be constrained only by a budget and by our ability to convince policy makers about the important opportunities that would flow from expanding bandwidth.

**Cross:** What challenges do chancellors, presidents, provosts, and other senior leaders have with developing an integrated strategy for dealing with e-business, e-learning, instructional development, research, and public service?

**Broad:** I believe we face enormous challenges. Let me cite three of them. First, many of our policies and business practices are going to have to be revamped to e-enable our institutions; and universities, I believe, must continue to push inefficiencies out of our business practices and enhance the effectiveness of our relationship with students, faculty, and alumni in ways that e-business will make possible.

The second challenge that I would mention relates to a combination of campus culture, governing structure, and resource issues, all of which present enormous challenges to higher education leaders. No doubt about it. But I also am optimistic in that universities are places where good ideas become very contagious and best practices are equally contagious. At the end of the day, it is more likely that the people must be transformed, not the technology.

The third area that I would mention is universities must remember that it’s not necessary for us to handle every single aspect of content development, course administration, support services, and instructional delivery. We don’t have to do all of that internally within the university. I am a great supporter of partnerships, and there are many viable models of consortia and outsource service models that we should consider.
am intrigued, for example, in observing where there are consortial arrangements and partnerships. I believe these have tremendous potential because none of us has access to all of the necessary risk capital to launch the e-learning initiative on our own. The for-profit institutions and, I believe arguably, community colleges could lead the way because they respond more quickly to expressions of needs on the part of prospective students or what they might call their customers.

**Cross:** Research indicates that the toughest challenges in exploiting technology in the classroom and content development will be people and culture related. As you’ve alluded to earlier changing culture on our campuses across the country is very important. Given this fact, what would you say are the key elements of an effective vision and strategy and value proposition for campuses as they grapple with a new environment that includes e-technology, e-learning, and e-commerce?

**Broad:** I believe that question is among the most important and one for which there are not completely clear answers. I believe we are still experimenting with strategies and the value proposition. The University of North Carolina has established a Teaching and Learning with Technology Collaborative among all of our 16 campuses. I believe this is one important strategy. It has the objectives that include leveraging existing efforts on our campuses in instructional support of faculty, professional development, content creation, and course management.

One of the focus areas for our Teaching and Learning with Technology Collaborative is assessment. Seven of the campuses of UNC have been using tools to assess the effectiveness of instructional technology and there are several ongoing efforts within higher education more broadly to evaluate the effectiveness of the use of technology in instruction. I am thinking of organizations like the National Learning Infrastructure Initiative (NLII).

Another one that we are involved in is MERLOT, the Multimedia Educational Research for Learning and Online Technology. Those are important strategies for understanding the value proposition for e-learning. I am very interested in the Army’s online initiative to see what we may learn about the vision, the strategy, and the value proposition from that significant and well-funded project.

**Cross:** Sometimes faculty have been reluctant to embrace the use of technology in teaching and learning for various reasons (intellectual property considerations, lack of reward system, technology complexity). What are some of the best practices that campuses have used to overcome this resistance?

**Broad:** Involving the faculty is key and the primary step that IT leadership must take to overcome the cultural barriers and resistance. At the University of North Carolina we have developed an intellectual property framework that enables each one of our campuses to develop and implement a balanced policy for intellectual property. So having a good, balanced, well-considered and well-understood intellectual property framework is one of the key components to the efforts to secure support from faculty. I believe that collaboratives such as the one I described, our Teaching and Learning with Technology Collaborative, is yet another way to interact directly with faculty through centers that are campus based where they have easy access and opportunity to engage in professional development. Academic leaders within the University of North Carolina are also working on innovative reward systems to encourage faculty to adopt usage of instructional technologies.

**Cross:** Convergence is believed by some to be a revolutionary step in the migration and management of different communications streams: voice, data, video, and other media. What impact will convergence have on the classroom, e-learning, content development, instructional delivery, and other innovative campus initiatives? Clearly it’s something that Internet2 is looking at as a result of IP-based multimedia applications.

**Broad:** Exactly. North Carolina had one of the very first networks for data and video in the nation. And we are deploying voice and video over IP where this technology makes sense. So we are doing some significant experimenting with IP networks.

One impact this has had is that the network has been a part of instructional delivery for some time, and as this convergence progresses our institutions rely on a robust and secure network more than ever, which brings us back to the original topic that you raised, the importance of achieving security in the network and of having access to a robust network. Again, the diversity of our campuses will spawn initiatives that are specific to their campus, but as more resources become digital such as digital TV, I am confident that content and new delivery options will continue to emerge.
One area that is of burning importance to me is in teacher education. It is of burning importance to me because in North Carolina, as in a number of other states, we are facing a daunting crisis in the gap between the demand and supply of well-prepared, high-quality teachers.

I think education is the defining domestic policy issue for this nation. Before September 11 I might not have even limited it to being domestic, but I do believe it is a defining issue for our country. It is an issue where collective investment and priority attention to e-learning can make a very important difference in the preparation of teachers but also in the ongoing professional development of teachers.

Teaching in our schools can be a very intellectually isolating experience. If we want these professionals to sustain their knowledge and awareness of pedagogy and their intellectual understanding of the content they are teaching, I believe we can effectively use e-learning strategies. So it is my hope that we can find, with access to all of these new tools, the resources and commitment to try to address these important issues.

At the top of my priority list is to try to figure out how we can respond to this very strategically important issue by using some of our new capabilities in information technology. As much as I think it is important for our armed forces to advance their understanding of mathematics and science in the digital world—and increasingly the impact of that is very important to our national security—I think it is also important that we find expanded ways to increase the pool of well-qualified teachers and then provide the means for keeping them up-to-date in their profession.

Cross: I couldn’t agree with you more. It’s imperative that our future teachers be able to think creatively about the technology and how they can use it in new and innovative ways.

Reach UNC President Molly Broad at mbroad@northcarolina.edu. Reach Dr. James S. Cross at jcross@mtu.edu.
Communications professionals are working hard to bring the Internet into the classroom as the Web is increasingly integrated into the learning process. Technological innovations and collaboration among departments are bringing faculty, staff, and administrators together in the process of delivering education in the 21st century. Three campuses provide examples of how technology is enabling access to information for today's students and what some of the challenges that come with it are.

**Stanford University**

When asked what impact the Internet has had on the classroom and those who provide telecommunications services, Jane Marcus at Stanford replied, "More bandwidth. The short answer is more bandwidth." As academic liaison for Information Technology Systems and Services, Marcus has firsthand knowledge of what faculty and students want and need.

Stanford's entire campus is networked, so faculty and students can access the school's databases as well as much of the information from the library from anywhere on campus. And Marcus feels the faculty is more progressive than on some campuses, estimating that 99 percent are comfortable with the technology that allows them to do research on the Internet, correspond by e-mail, and use word processing on a daily basis.

"The Internet has totally changed the resources available to students and faculty," says Marcus. "These are very rich resources, and both faculty and students want them available for instruction. While it varies widely what may be required from one classroom to the next, of course, the network must be robust and it must be reliable and it must be available—preferably 24/7."

"The students' push more and more reflects their experience as the connected generation," says Marcus. "And there is some feeling that when the students are here, this is their home. The question arises, is it the responsibility of Stanford to provide services equal to what they have at home? We don't charge a technology fee; in addition to computer connections, should we provide CATV, media on the Internet? It's an interesting perspective."

ACUTA President Maureen Trimm, associate director of Technology and Academic Services at Stanford, agrees and adds, "While bandwidth is absolutely critical, there's also a local infrastructure issue in each classroom, and that basically is wiring. As the classroom is expected to have access to the Internet, obviously classrooms need to be wired to bring it in. And in some places that is a true challenge.

"The question becomes how much is appropriate in each classroom? Is it a matter of an Internet connection at a podium and therefore one jack that needs to be in the classroom? Is it a matter that each seat for a student is expected to be connected to the Internet and therefore having to wire each location? Or is it a matter..."
of bringing wireless into the classroom so that the physical infrastructure is actually supported over air rather than over the wire?"

Another issue, says Trimm, is that of support expectations. "As faculty become more comfortable using Internet technologies, they begin to get a plug-and-play expectation, that they can go into any classroom and be able to use whatever mediated facilities they had planned for their presentation, program, or lecture. That means bring in whatever type of laptop they have and plug it into a system that would allow them, instantaneously, either to use large screens or to send material to notebooks in the classroom."

Trimm says this is already happening in some places. A number of classrooms at Stanford already have some standard configurations so that at least the technology is supposed to be in place. "Once you put that in there," says Trimm, "there's the expectation that it's going to work the first time every time. And faculty members who arrive five minutes before a lecture expect to be able to plug and play. And if it is not ready, there's a support issue. If something has been changed by the people using that classroom previously, it becomes an issue of how do you support the faculty member in a hurry."

Trimm says plug-and-play expectations carry over to videoconferencing. Some want to bring lecturers or guests into a classroom without allowing for presetting the room. Videoconferencing technology simply is not there in terms of plug-and-play.

This level of support is something new for ACUTA members, says Trimm. "Many ACUTA members have been required to support a videoconferencing room or a media classroom, but now many are expected to support multiple facilities. I think strategic plans are in place in many schools that all classrooms will have a standard media outlet and setup services."

Not only is administration not aware of the enormity of the support issue, Trimm says, "We're also talking about a lot of money. For example, the Stanford law school did a major upgrade of all of their classrooms this year. Basically it ended up costing about a half-million dollars each to upgrade classrooms to support this generation." That sort of huge project, on some campuses, is overburdening telecom budgets as well as staff.

"The Web," Marcus says, "is a completely pervasive innovation that's revolutionized how we transmit information in exciting ways. How to pay for these changes and support them is a challenge."

**The State University of New York at Buffalo**

College IT professionals are no longer responsible just for connecting their own campuses to the Web, according to Lisa Stephens, associate director of Distance Learning Operations, and Christine Chelus, director of New Media Projects at UB's Graduate School of Education. Stephens and Chelus are responsible for sending interactive video course content from the University at Buffalo campus to more than 100 sites in upstate New York that are connected by a private fiber network called the Western New York Distance Learning Network.

"However," said Stephens, "we're seeing a growing demand for courses that highlight the convergence of technologies: Both video and text can be increasingly delivered online."

The University has recently adopted a campuswide course management tool called BlackBoard. This browser-based tool allows students within a particular course to access information related to the course easily, stay in touch with one another through chat rooms, submit papers, and take exams. BlackBoard is also being used to deliver Web-based courses to distance-learning students.

This network has led to the creation of interactive video classrooms where groups of students can come together and interact with one another as well as with students and the professor in a classroom at a distant location, according to Stephens. The program is being expanded so students can use the Web to access course information directly and get video images of classroom activities sent directly to their computers.

"One of the biggest challenges facing our department professionals is embedding video into Web pages—combining the strengths of video and text to create a richer learning environment," Stephens said. "I hope that in the near future we'll be able to take advantage of real-time interactive video exchanges from a student's desktop."

As a member of Internet2, the University at Buffalo has already offered several interactive video courses across IP networks, launched by an early success between UB and Stanford nearly two years ago; but trying to offer full-motion video on the regular Internet would be "dicey" according to Stephens.

Meanwhile, a number of departments within the University are experimenting with video streaming
across the Web, or packaging large video files onto a CD-ROM that distance students insert into their computers at home. These students are authenticated into their class each time they sign on through the University on BlackBoard, but they don’t face any video download waits when they click on links that are served by the local CD.

Christine Chelus enjoys the flexibility that BlackBoard offers for course management. "It allows faculty to make grades, tests, and course documents available on the Web and to create electronic drop boxes where students can ‘hand in’ papers. It also enables faculty to create virtual chat groups where course issues can be discussed, and to pull up Web sites and show them to the entire class during a lecture in real time if desired.”

**Virginia Tech**

At Virginia Tech in Blacksburg, Virginia, wireless Internet is the latest step in providing convenient and ubiquitous Web access to students, faculty, and staff in the University’s new Advanced Communications and Information Technology Center, Torgersen Hall.

Virginia Tech established 802.11b wireless service in Torgersen Hall a year ago, and will add several more buildings in the near future, said John Moore, EdD, director of educational technologies at Virginia Tech. Wireless makes much more flexible teaching and learning arrangements possible, both in and out of the classroom. Wireless networking enables students to use their laptops more productively beyond the dorm room or classroom. Students can keep working on projects outside of classrooms in Torgersen’s wireless-equipped study atrium, where small groups of students with laptops are a common sight. They can go from there through the electronic reading room to the adjoining Newman Library, without dropping their Internet connection.

Educational Technologies uses 100baseT Ethernet connections to connect Sun servers running two course management systems—BlackBoard and WebCT—to the Internet. Each semester more than 500 active courses are hosted on the BlackBoard system alone, with more than 10,000 student accounts in use at any time. With the integration of administrative data into the BlackBoard system, students can see all of their course information—including assignments, grades, announcements, and other information related to their courses—from computers on campus or through the Internet.

IT professionals and academic administrators at Virginia Tech know that students aren’t the only people on a campus who need instruction. Faculty need to know how to use and leverage new technology. To enhance teaching and learning, in 1993 Virginia Tech introduced the Faculty Development Institute (FDI). One of its agendas, according to Moore, “is to provide faculty with both the means and the training to effectively use instructional technology.” On a recurring basis, every four years, faculty are offered a slot in a three-day workshop. Typically, this training class involves 20-25 people and happens in the summer. At the completion of this event, participants receive a new computer plus the software and training to apply it in the classroom.

“We have about 1,500 faculty here at Virginia Tech, and we have about 95 percent participation in this program,” says Moore.

Virginia Tech is using advanced technology to improve the learning environment as well as course content. Each classroom in Torgersen Hall enables faculty members to control almost everything in the classroom from their podium. A touch panel controls lights, shades, and projection equipment. Using this panel, a professor wanting to show the class a CAD diagram on the ceiling-mounted computer projector could activate the projector, dim the lights, and close the shades without leaving the podium. The panel also provides control over an Elmo digital camera, DVD, audio, and VCR from the podium and the ability to project images from the professor’s computer onto a screen for the entire class to see.

Another innovation at Virginia Tech is the Math Emporium, a learning lab used by more than 10,000 students each semester. This building is equipped with 500 computers and is open 24 hours a day. The Math Emporium has been credited with making striking improvements in the way students learn math.

These three campuses demonstrate a few of the ways that technology and the Internet are bringing revolutionary changes to the learning environment. With these changes come a host of challenges for telecom professionals who are increasingly being asked to participate in the planning process and provide support for new technologies.

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▼
by Curt Harler
Contributing Editor

From small colleges tucked away in the countryside to huge downtown universities, the attacks at the World Trade Center and the Pentagon forever changed the way network administrators look at disaster prevention and recovery.

“There has been a paradigm shift in the way we think about outages and disasters,” says Jeff Drew, practice director of the performance practice at Greenwich Technology Partners, White Plains, New York. “It used to be we planned for outages of five hours or maybe a week. Now we have to ask what happens if the building ceases to exist,” he says.

Lessons Learned at Longwood

A major disaster doesn’t require terrorists. It can happen anywhere, anytime. This past April, for example, fire took Longwood College in Farmville, Virginia, by surprise.

“It didn’t turn out as bad as it might have, but we sure learned a few things,” says Mark Kendrick, manager of communications and technology. For one thing, the number of alarms he got as a result of the blaze simply dazzled him.

Four residence halls, an academic building, and a building being renovated were affected. Fire damaged the top floor of the academic building, and smoke damage and water damage were felt on the three lower floors.

Luckily for Longwood, the centralized system for all telecommunications and information services was housed in a different building. Several switches were lost, but the central office was isolated from the fire area. The night of the fire, phone operators, IS, and telecom people were more than busy—but that was just the start. Recovering data on a whole fleet of hard drives became their top priority. Here, they were both lucky and good.

“If there is something important on your computer—something you really want, like your thesis research—back it up to an off-campus site.” These are Kendrick’s first words of advice. Many people on campus faithfully backed up their hard drives to a CD or zip drive. Then they left the zip disk right next to the computer in the office. It was toast.
“Create a centralized server remote from your location and back up all data files,” Kendrick emphasizes. For individuals, the Web can be a handy tool for backing up such systems. Material can be e-mailed to a home PC or to a secure computer elsewhere.

Longwood hired Coastal Technology Services of Atlanta to help recover data. “Of all the academic offices, only one hard drive was unrecoverable,” Kendrick says in amazement. “We lost a couple of sectors on a few others, but nothing major.”

Kendrick knew they would get only one shot when they brought up the damaged hard drives. They immediately backed up each unit to a central server and went from there. The biggest loss was an older Tanberg computer in the language lab.

“It was more economical to replace it with a new system than to recover it,” he says.

Go with New Equipment

In the case of the World Trade Center businesses, there was no question they would require new communications and computing gear. Longwood’s Kendrick says that may be a blessing in disguise.

“I’d have to say that, in a time like this, recovery of all electronic gear might not be the best thing,” Kendrick continues. While early success encouraged Longwood to pursue further recovery of units at the school, he has found that many hidden problems, mostly caused by water damage, show up outside the 90-day repair warranty period.

It is also important to know what you had on site before the disaster—for many reasons.

“Keep good records. Have a complete inventory,” he says. Like most others with 20/20 hindsight, Kendrick wishes he had had the correct documentation to give the insurance adjustors. In a stressful time he had to wade through that paperwork to get the school’s inventory updated.

Documentation must include building infrastructure, he reminds. He suggests using digital photos, video, or a paper inventory system to assure a complete listing. And salvaging a CPU and monitor does not mean that the mouse, mouse pad, and other peripherals will not have to be replaced too.

Recovering Elsewhere

The World Trade Center disaster in September was the ultimate problem for business recovery and made a good argument for having a remote recovery plan in place. Richard DeSoto, senior vice president of Altigen, Fremont, California (www.altigen.com) says they had three customers on IP-based systems and were able to get two of them up and running as soon as they found office space.

Sometimes the Internet can become a school’s safety net. “With the Internet and VPNs (virtual private networks) you can put in a solution and allow everyone to work for a few days from home or a card table in a hotel,” Greenwich’s Drew says. “The idea is to minimize the infrastructure replacement required, using Internet gateways rather than buying T3s.”

The experience of those small businesses in the World Trade Center would hold for anyone—college or business—in a similar fix. All that was required was to assign separate IP addresses to an IP extension. The basic requirement is to have products that are H.323 compatible. In Altigen’s case, the systems are certified to work with products from vendors like Siemens and Polycom, so getting them turned up was not a problem.

“As for connectivity, it is better to have DSL or a cable modem to do simultaneous voice and data,” DeSoto says. With their proprietary software algorithms in the jitter buffer, they are able to improve the turnaround at each end and send the packets at an even flow rate, thus realizing better quality over the Internet.

Like Insurance

It used to be that disaster recovery could be equated with an
insurance policy, Drew says. Users looked at the value of the thing they were insuring, what they would have to pay for insuring it, and what their recovery cost would be.

“The value of the network at risk used to be 40 hours of downtime,” he says. “Now it is 40 hours of downtime plus the cost of the entire infrastructure that is at risk.” That means that the value proposition on disaster recovery has switched and, as a result, the premiums will increase. Drew says that both clients and consultants are just starting to get a grasp on this new statement of the problem.

Using the Internet as a bridge seems the simplest, most direct solution in the face of a long-term outage.

Benjamin Tartaglia, executive director of the International Disaster Recovery Association, Shrewsbury, Massachusetts (www.idra.com), offers several ideas for telecom managers to consider.

First, Tartaglia advises being clear on what specific parts of a school’s backup and disaster recovery planning the Internet will be used to cover. For instance, it may be feasible to use your ISP as an alternate site for your on-site server.

He says telecom managers should consider using the Internet and its related components for other applications, such as:

- A remote access network for people working from home when the main site is unavailable or unreachable.
- A grasp on the Internet for disaster recovery. “Expect less than acceptable support (from a user standpoint) between ISPs and LECs, CLECs, ILECs, and BLECs when an outage occurs,” Tartaglia warns. “Expect lots of finger-pointing.”

Before putting too many eggs in any ISP’s basket, be sure to review the business continuation plan for the ISP(s) you use, Tartaglia says. “Will you use more than one ISP, served from separate COs [central offices], carriers, and networks?” he asks. Be sure to find out if this is even a possibility, he says.

If using multiple ISPs and several central offices does have appeal, make sure you know how you can test the arrangement.

Look at the last mile from your school’s point of presence to your CO, Tartaglia says. Then check the link from the ISP’s CO to its point of presence and to its server(s). “These may not be in the same location,” he says.

**Recovery Phases**

Drew says any recovery effort will go through three separate phases. The first effort will be simply to get the network back up. The second phase is to establish a temporary site where people will be able to work until they get to phase three, a more permanent solution that deals with the performance and security issues common to any network.
Phase three requires a quick, accelerated restructuring of the network, Drew says. As Kendrick found out, that will require making some very quick decisions about whether to update legacy systems or replace them with state-of-the art technology. While he admits it will be expensive and off budget, Drew says that it is probably better to go ahead and update rather than sink money into something that is close to the end of its life.

Internet Security

Whatever the application, there is a lot of money being spent on security. Total end-user expenditures for security products, managed security services, and PKI products and services purchased in the United States and Canada will grow 239 percent, from $2.8 billion to $9.5 billion between 2001 and 2005, according to Infonetics Research’s latest study, “User Plans for Security Products and Services, US/Canada 2001.”

It is not a local phenomenon. Worldwide, end-user expenditures for firewalls and managed firewall services will grow 231 percent.

“Security is hot despite the economic slowdown,” says analyst Jeff Wilson, Infonetics Research’s executive director. “Security technologies used to be applied to the network edge, protecting the borders of the local area network, but increasingly we see guards posted at every corner: in LAN switches and routers, data center products, WAN routers, and other access devices.

“As the cost of Internet connectivity comes down and the availability of broadband connections goes up, enterprises are equipping more and more sites with Internet connections, all of which need to be protected.”

Not surprisingly, ease of use is important to more respondents than any other firewall feature, according to the 240 purchase decision-making network managers at small, medium, and large organizations who responded to the Infonetics study.

Some 52 percent of respondents believe they have never had a security breach, although their more cynical counterparts might respond, “Just you wait.”

The primary drivers for purchasing managed security services are increased service reliability and access to security expertise, Wilson says.

Unlike H-compression formats and MPEC video solutions that produce video sequences based on changes within an occasional reference image, the quality of JPEG images is always guaranteed. In security applications, this consistency is vital.

Daily Security

Not all security concerns are the results of a disaster. Use of the Web for daily monitoring is another commonplace application. Although other image formats, like H.261/H.263, MPEG, and Wavelet will generate video sequences of reasonable quality, JPEG is generally preferable because moving JPEG format is native to all standard Web browsers.

Live video streams can be displayed from any workstation platform on the network—with no special client software required on the viewing platform.

Another advantage of IP-based systems, especially in security applications, is that the IP signal can be transmitted live to any remote server. The criminal who steals the system VCR, along with the valuables in a university museum or college store, does not necessarily take his image away at the same time.

Other Points to Ponder

While he knows the Internet can be a big help both in disaster prevention and in security applications, there are a slew more questions Tartaglia says should be investigated.

“Have the building penetrations been checked at both ends? How good is the backup power at the ISP and your end? How about at the LEC’s site? How about for the fiber? How many hours?” Tartaglia asks.

“What about the customer services access at each of the vendors involved?” Tartaglia asks. “Does your person in charge have a 24/7 beeper/cell phone to troubleshoot, along with a laptop to perform remote diagnoses? What about the backup person?” he continues.

When push comes to shove, everyone is expected to pitch in; and universally, the response is gratifying. In Longwood’s case, recovery was “a group effort,” Kendrick says. Everyone backed up everyone else. “We all knew what was going on and everyone pitched in.”

Longwood’s situation appears headed for a happy ending. Locals and alumni donated a lot of money. An eight-year-old drummed up $200 in his neighborhood. Several students sent tuition money in early, expecting it to be used right away to help repair damages. This fall, despite the disaster, school started on time.

It makes one wonder how colleges ever existed before the age of the Internet and the web of safety it provides for instant communications and recovery.

Curt Harler is a freelance telecommunications writer and a regular contributor to ACUTA Journal. He can be reached at curt@curt harler.com.
Caught in the Web: How Schools Capture Alumni

by Chris Harrison

Web access—for students, teachers, administrators—is increasingly important for recruitment, retention, and research on today’s campuses. Even though that access is filled with both opportunity and ogres for those responsible for its administration and security, a growing number of schools have found their Web presence a useful tool for capturing alumni interest.

This flies in the face of predictions made in the early days when pundits claimed that the Web would simply be another way of alienating people from one another. In addition to TV and video games, time spent on the Internet would remove us further from human contact. However, just the opposite has proven to be true.

Several colleges are using the Internet to draw alumni back to campus—virtually, if not in reality. Special alumni home pages and Web cameras are great ways to keep alums feeling “warm and fuzzy” about the old alma mater.

Pages Just for Alums

Miami University of Ohio posts a Web page (http://www.muohio.edu/alumni) for its alums to use when they start up their browser. It provides alums with just about every bit of news they could want to know about life in Oxford. A virtual tour of campus takes alums to Roudebush Hall, the Beta Bells, or the Sundial.

Acknowledging town as well as gown, Miami’s site offers a look at the changes in the downtown Oxford area, including a preview of the area’s new parking garage. For alums who have been away for a while, Miami’s site also links new construction to locations more familiar to students of past decades.

Miami University’s site also lets in-state residents know how to get affiliated license plates for their cars from the State of Ohio. Links make it easy to order license plates with the school logo embossed on them. Not only does the Web site encourage alums to “demonstrate your love and honor to Miami,” it points out that buying the affinity license plates will help support the University’s scholarship fund. Miami’s share of the cost ($25 of the $35 annual plate fee) goes directly to academic scholarships for Miami students. That is another way to help the Web site pay back directly to the University’s coffers.

Alums of Hamline University can wallpaper their PCs with a trio of scenes from the school in St. Paul, Minnesota (http://web.hamline.edu/alumni.laha.htm). If decorating their computer with Hamline scenes isn’t enough to whet an alum’s appetite to hit the home page, there are links to the home pages of other Hamline alums, class pages, and even a link allowing alums to send e-mails to favorite faculty members (or perhaps to ask why they only got a B+ in their course).
Hit http://my.ucla.edu and learn everything you need to know about the University of California, Los Angeles, from the current temperature and traffic conditions around the campus to the latest news and events of interest to the UCLA family. All sorts of groups, ranging from the Latino Alumni group to Xi Deuteron chapter of the Alpha Epsilon Pi fraternity, make postings at the UCLA page.

At Duke University, Durham, North Carolina, alums can track down old friends or roommates by entering the person's last name and class year—which are the only required fields when searching for a classmate. In addition, alums can enroll in the directory themselves or change their listing by going online at the http://venus.duke.edu/alumni site.

The University of Oregon, Eugene, is home of the Ducks. Their World Wide Webfoot Web site (http://alumni.uoregon.edu) gives alums the chance to send an e-postcard to other friends and alums, reminding them about such events as a Greek Weekend on campus. Not only does this tie alums closer to the school, but it allows them to cast a wider net, as it were, and bring other alums into the fold.

Web Cameras Tie in Alums

Several colleges use Web cameras to allow alums, big donors, and potential students to take a virtual visit to campus. The schools range in size from Penn State University to DePauw. Administrators at both ends of the spectrum say they are just as pleased with the results as the alumni are.

"We purchased some cameras and had them installed. It wasn't a major project," says Thomas Moore, associate director of information systems at Penn State University. The Penn State Alumni Association sponsors several live cams including two at the HUB, the student union building. To get a view of what is going on in Penn State’s Happy Valley, click on http://www.alumni.psu.edu/hub/default.htm.

"It was a simple project," Moore says. Penn State went with a trio of Axis 2120 cameras. They come complete with built-in Web server and motion detection. With some other hardware and electrical outlets, the total bill was about $3,500. "Pretty cheap," Moore says.

Penn State planned ahead for Web cameras, so when the HUB was refurbished, the connectivity was there. "All you need is an Internet backbone connection," Moore continues.

DePauw University, Greencastle, Indiana, is another school with a campus Web camera. To visit its main quad, hit http://www.depauw.edu/images/webcam. DePauw uses the Axis 2100 camera for its site, a network camera. Dan Pfeifer, University Web director, says it's important to make the distinction between a network camera and a camera that requires a dedicated computer for its use.

At both DePauw and Penn State no dedicated PC is required for transmitting images over a WAN, LAN, or the Internet. "It really was a simple project," Moore says. "Since the Axis doesn't need a computer, all you have to do is give the cameras an IP address so you can reset or change them. We had them up and running in 15 minutes." As at any school, Moore says, the challenge is to find a free backbone connection.

Pfeifer does not dismiss the technological savvy required. "It does take some networking knowledge to install. You have to run ARP executables," he says. DePauw's system runs over Ethernet, both as a 15 kb JPEG image on the super-high bandwidth link and as a Java script for the image, which renews every 15 seconds.

Location, Location, Location

Perhaps more complex than the IP-infrastructure work was determining locations for the cameras. These are not security cameras; they are meant to show alumni and interested people views of the school. At Penn State, the Nittany Lion statue was considered as an obvious choice but was rejected because there is no backbone connection nearby. Beaver Stadium was another popular option, but the alumni office ran afoul of broadcast copyright provisions. The football and soccer practice fields were out of the question (no Penn Stater would have been able to log on till after all the opposing Big 10 coaches got through). But the HUB, Mount Nittany, and the gates to Old Main all were acceptable both from an interest and a connectivity point of view.

At Division III DePauw, the stadium is likely to be the next place for a camera. Since it does not anticipate problems that the big-money sports programs face, alums will be able to see what is happening in the stadium over the Internet.

Miami of Ohio solves the sports copyright problem neatly, giving visitors a chance to take in a virtual-reality intramural soccer match. Intramurals rarely make ESPN or national TV. View the campus from Miami of Ohio’s Webcam at http://www.ucm.muohio.edu/About_Miami/Virtual_Tour/webcam/index.cfm.

"We wanted to give alums an opportunity to get a live look at campus," says Pfeifer, who prefers the title Web Yoda. DePauw chose its location in the Academic Quad because it expected a lot of action there. The original idea when the camera was installed two
September's ago was to show the change of seasons. It is also a busy place, with all 2,300 students passing through often. Pfeifer is a bit surprised that the students have not started chalking messages on the walks or hanging banners near the cameras.

There were some early concerns at both Penn State and DePauw about the legality of the cameras. "We checked with our legal staff, and they said there was no problem with the Web cameras in public," Moore says. Pfeifer says that the students soon realized that individual images were too small to be discerned from the camera.

The University of Oregon also has a Web camera application called Weathercam, operated by the school's Climate Lab in the Department of Geography (http://geography.uoregon.edu/weather/weathercam/wxcam.htm). It provides users a view from UO's campus looking northeast over the Willamette Valley toward the Coburg Hills. The camera is connected directly to the University's Ethernet campus network, and images are downloaded to the Climate Lab's Web server using the camera's CHRON script service.

TommyCam at the University of Southern California offers a view of the center of campus from a camera located in the Student Union Building. The bronze statue of the school's collegiate symbol, Tommy Trojan, stands at the center of the picture. Off to the left, viewers see the Bovard Administration and to the right is Trousdale Parkway. Just to keep the alums feeling wanted and loved they get a peek of Alumni Park, in front of Doheny Library in the upper right of the frame.

Beyond static images, USC offers a virtual-reality tour of campus. Taking the tour requires a Quicktime 4 player, available free from Apple (for both Macintosh and Windows machines). Even if you are not an alumnus of USC, it is worth hitting http://www.usc.edu/uscweb/cams/tommymcam/vrtour/ just to see how the virtual reality technology works.

The South Dakota School of Mines and Technology is another school that offers a live view of its quad. If you don't want to run up to Rapid City to visit campus, you can see the site by clicking on http://quadcam.sdsmt.edu/view/view.shtml. Like many other schools, it uses the AXIS ActiveX Camera Control, which enables alums to view live image streams in Microsoft Internet Explorer.

Better yet, click on the DinoCam at SDSMT http://dinocam.sdsmt.edu/view/view.shtml) and catch a view of a couple of its dinosaurs, which are housed in the Geology Museum there.

Web Security

Another nonteaching application making increasing use of the Internet is Web cameras for security. Schools seem reluctant to discuss security deployments, first because of the privacy and security issues, and second because they do not want their systems to become the target of real or virtual vandalism.

Companies like X10 Wireless Technology, Seattle, Washington (www.x10wti.com), have security systems perfect for smaller colleges or single-department use. X10's product is aimed at small-office networking, which puts it in the middle of the conflict over different networking technologies. X10's product is built around wireless, phone line, power line, and Ethernet infrastructures.

Current designs are based on wireless technology standards and protocols, such as 802.11, 802.11a, 802.11b, HomeRF, and Bluetooth, that operate in the unlicensed 2.4 GHz and 5 GHz frequency bands.

X10 notes today's solutions suffer from a variety of constraints including high cost, difficult installation and use, limited interoperability with legacy equipment, low execution and acceptance in the marketplace, and a general inability to deliver broadband content.

Eating up Web Sites

Monitoring cameras can show up in some pretty unlikely places. The next project at DePauw will be to put a camera in the cafeteria so students can monitor how busy the food line gets and adjust their lunch or dinner hours accordingly. It is simply another nontraditional way to use the Web to make life easier outside the classroom.

For those interested in food, the Kansas State University alumni pages—done in purple, no surprise—list places to dine around Manhattan in addition to access to the K-Stater magazine and alumni events. (http://www.k-state.com)

Hamline offers a similar service, divided into restaurants with cheap eats and places with moderate prices. In addition, it provides a list of cultural events for those visiting the campus area.

Whether their site offers static information or real-time video, personal links or license plates, administrators are happy with alumni response. Most would echo DePauw's Pfeifer who says, "I'm very pleased with our application. It ranks pretty high on our site for number of hits."

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UConn Wins Control of Campus Infrastructure

by Robert P. Vietzke
University of Connecticut

After nearly three years of negotiations, regulatory hearings, and finally a civil court action, the University of Connecticut has secured a final victory in its dispute with its local cable company, Charter Communications. The end to this hard-fought dispute secures for the University of Connecticut the campus's right to own and operate its own institutional video system.

Why the Battle Began

UConn's legal battle began as a result of the University's attempt to upgrade its campus video services at the expiration of a 10-year agreement with the cable company that dated back to 1989. As early as 1993, the University expressed its intent to improve its academic and institutional video service offerings by moving to a University-funded bulk service that would be "on" in every academic and student room at all times. The new network would add more educational programming on the campus including new channels for language, government affairs, news, computer training, and student programming.

As a secondary goal, the University also wanted to address years of student complaints about service and pricing by significantly reducing the total cost of providing video services on the campus.

Upon learning of the University's new system, the cable company filed for regulatory relief with the State Department of Public Utility Control (DPUC), requesting a declaratory ruling that would assert Connecticut's mandatory access law for multiple dwelling units as a justification for the company to continue to stay on the campus and use the campus's conduit infrastructure even after their ten-year agreement expired in August 1999.

The cable company also asserted that the University's system should be declared an illegal un-franchised cable television system because, from its viewpoint, the public status of the University of Connecticut made all campus roads "public streets." According to traditional cable industry interpretation of federal communications law, crossing a public street with a multichannel video service required a public franchise, which the company knew UConn didn't have.

After reviewing Connecticut and federal law, the assistant attorneys general responsible for the University supported the University position...
that the campus video system failed to meet the conditions that require regulatory oversight of local and federal bodies for a "cable system." Common understanding of federal and state law held that:

- There must be subscribers of video services and subscriber interaction.
- The system must be in, under, or over any public street.

The University believed its system did not meet the criteria of having "subscribers" because the service was "on" in every room, eliminating the "subscriber interaction." The University also had exclusive control of the roads on the campus and considered them to be "state institutional roads," not public streets. (In fact the University had unilaterally converted several of the "public" roads the cable company had referred to in its filings into a pedestrian mall.) Finally, Connecticut law gives the University explicit control of the campus property, which the University and its attorneys believed could not be infringed by a private company. As a result, the University believed it had a strong case to continue its service without cable company assistance.

The DPUC generally disagreed with the University, and although it did not rule to shut down the University's system, it did give the cable company the green light to continue to provide service to students without the University's permission. The DPUC also allowed the company to use University-owned underground conduits without compensation to the University or any oversight restrictions.

Although it was not a direct issue in the company's request, the DPUC also indicated that it was concerned that the University's system appeared to have some characteristics of a cable system that might not withstand direct scrutiny.

The cable company, disappointed that only their rights were protected and the University's were not denied, filed for a new declaratory ruling focused on shutting down the University's network. Within weeks, the University also filed new litigation in the form of an appeal of the DPUC's first decision along with a "request to stay" to block the DPUC from any further actions on Charter's new request until the Connecticut Superior Court determined the DPUC's jurisdiction over another state agency like the University.

As the superior court scheduled the appeal, the University accelerated the activation of its no-charge service to an additional 4,000 residence-hall rooms, which the cable company later alleged had the effect of eliminating 95 percent of its campus subscribers.
The battle intensified when the company filed a new 60-page lawsuit in a different branch of the Connecticut Superior Court, claiming that much of the University’s voice, video, and data networks were being operated illegally without the proper regulatory approvals. One remedy suggested that the University should be forced to sell its video and data infrastructures to the company so that they could be operated properly. This lawsuit, which was directed both at the University and at its satellite video provider asserted that the University’s “tying” of mandatory room rates to Ethernet, telephone, and video services constituted unfair business practices and essential creation of a monopoly service by the University. Unlike the previous filings that focused on cable television and regulatory policy, this new suit opened a new front by accusing the University’s Information Technology group of breaking antitrust and fair business practice law in its provisioning of resident student video and data services.

The five counts of the lawsuit against the University and its vendor by the cable company included:

- Infringement of cable franchise rights
- Engagement in predatory pricing
- Engagement in illegal tying arrangement
- Tortuous interference with business expectations
- Engagement in unfair competition or trade practices.

In response to an increasingly aggressive approach by the company and the possibility of the dispute spreading to data and voice services as well, Connecticut’s attorney general personally took an interest in the case and began arguing portions of the University’s case before the superior court judge. The University also hired communications law expert Alan Fishel of Arent, Fox, Kintner, Plotkin & Kahn in Washington, D.C. The University selected Fishel, in part, because he had a recent history of successfully representing a client that argued it did not need a cable franchise to provide video service where the video signal traveled across the public right-of-way through the incumbent local exchange carrier’s facilities.

In the spring, the judge accepted briefs on the applicability of certain Connecticut laws against a state agency such as the University of Connecticut. Under long-established Connecticut precedent, the judge agreed with the University that the predatory pricing, illegal tying, and unfair trade counts should be dismissed on the jurisdictional grounds that the University as a state agency was immune to certain laws. This left the University to defend the tortuous interference and franchise infringement components of the company’s original suits.

After several hearings, the judge agreed to issue a final decision as a summary judgment, a process that precludes the need for a trial when there are only issues of law and not issues of fact in dispute. In a November 4, 2000, decision, Judge Thomas Bishop issued a 20-page decision that narrowly dismissed all of the cable company’s remaining accusations. The ruling finally denied the company access to the campus and affirmed that the University had the right to provide its own services.

Perhaps the most noteworthy statements in the judge’s decision were:

Connecticut’s statutory Scheme, CGS 16-331 et. Seq., relating to cable operators, was enacted pursuant to provisions of the Cable Communications Policy Act (CCP)… the CCP provides that a cable operator may not provide cable service without a franchise. ...A “cable system” is defined as “... a facility, consisting of a set of closed transmission paths and associated signal generation, reception, and control equipment that is designed to provide cable service which includes video programming and which is provided to multiple subscribers within a community, but such term does not include ... (B) a facility that serves subscribers without using any public right of way.”

The CCPA further defines cable service as “... the one-way transmission to subscribers of video programming...,” the term ‘subscriber’ is defined by regulation as ‘a member of the general public who receives broadcast programming distributed by a cable television system...’

UConn students who reside in dormitories are not members of the general public. While in one sense, every human being is a member of the general public, when a group of individuals is separated from the general public by a commonality, which defines membership in the group and distinguishes the group from the public at large... then membership in the group is a characteristic which separates group members from the general public...

Additionally, HUSKYvision has no subscribers. While the plaintiff correctly points out that UConn has used the term ‘subscriber’ in regard to the likely number of outlets or destinations served by HUSKYvision, students do not, in fact, have any option whether or not to subscribe to this programming.

Although the decision was a resounding victory for the University, it failed to support some of the underly-
ing positions upon which the University had initially constructed its defense. Among several troubling asides, the judge stated in a footnote that although the state’s sovereign immunity removed the need to rule on whether or not residence halls met the criteria of a multiple dwelling unit, he would tend to give deference to the DPUC on such an issue if the need arose. The DPUC had ruled that residence halls were MDUs and that the cable company had a clear right to access the buildings without the University’s permission.

Following the court victory and during a period when there were no significant court proceedings underway, the University issued a new RFP for video programming, in part as a regularly scheduled refresh of a contract that was then nearly three years old. Three bidders including the current satellite provider, the cable company, and a third new vendor all submitted aggressive bids. As part of the request for proposal, each bidder was required to review explicit contract terms drafted by the University and Arent Fox attorney Fishel that codified the University’s exclusive rights, ownership, and operation of its system.

In a split award, the University continued its longstanding relationship with its satellite provider, but also awarded a portion of the contract to the cable company, in part to improve off-air broadcast station reception, which was always spotty in rural Storrs, Connecticut. Following the award, the cable company withdrew its appeal of the superior court decision, eliminating the possibility of appeal of the only positive decision that favored the University.

After nearly three years of hearings and decisions, many of which were discouraging, the University believes it has received the first judicial ruling stating that students are not members of the general public for the purposes of the CCPA as it is currently written. Although this is a Connecticut court ruling that may have no bearing outside of Connecticut, it is nonetheless the first ruling since a 1967 Federal Communications Commission ruling in favor of Purdue University’s video system that campus video services do not meet the state or federal definition of “cable service” because services provided to students are not services provided to “subscribers.”

For the University, the most difficult lesson to learn was that both the cable industry and the regulatory organizations seemed reluctant to carve out a university’s voice, data, and video telecommunications needs as anything different from those of any home subscriber to public services. The general lack of knowledge of the advanced and differentiated services that are present on many college campuses was pervasive, and the University’s ability to communicate its different service needs was repeatedly difficult as the discussion moved from hearing to hearing.

Service offerings, service relationships with students, housing bill mechanisms, and university maintenance procedures are all nearly alien to outsiders of the higher education community.

In the end, the struggle secured for the students a new suite of integrated voice, video, and data services in every residence hall. The court provided a narrow ruling that may be helpful to other universities and colleges forced to argue that their services should not be regulated like public utilities.

The magnitude of the effort and the lessons learned only heighten an awareness of an increasingly complex interrelationship between higher education, public utilities, and regulatory authorities. From this battle, communications professionals within the higher education community can take away a vigilance for protecting their campus’s interests separate from those of public utilities and an understanding that those tenets under which many colleges and universities interpret their own operating authority may not be the ones that outside entities see in their operations.

Reach Robert Vietzke, chief systems architect at the University of Connecticut at Rob.Vietzke@uconn.edu.

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People at Rowan University in New Jersey know Anthony Mordosky as associate provost. People who attend ACUTA events know him as the friendly guy with the big smile and the outrageous jackets. Now ACUTA members know Mordosky as the recipient of the 2001 Bill D. Morris Award.

This award, created in memory of ACUTA’s 1988-89 president, is presented annually to an ACUTA member who best represents the ideals that Bill Morris exemplified: dedication, vision, professionalism, and leadership. As outgoing ACUTA president Anthony Tanzi presented this award at ACUTA’s 30th Annual Conference at Lake Buena Vista, Florida, in July, he commented that Mordosky “has unquestionably exhibited those ideals at the institutions he has served, and in his many leadership roles within ACUTA.”

In his 12 years with ACUTA, Mordosky has held the positions of president, president-elect, secretary/treasurer, and director. He has served on several ACUTA committees, including the bylaws and policies committee and the nominating committee. He has been well received as a frequent presenter at ACUTA events, and has played a significant part in planning ACUTA local events in the Northeast/Mid-Atlantic area. In addition, he inspired the creation of the ACUTA Leadership Award, presented for the first time at the 2001 Conference.

“His leadership abilities were quickly recognized and put to work on behalf of our profession,” stated Tanzi. “As a director, [Mordosky] participated in the strategic planning process that resulted in a dramatic restructuring of the association to its present form of governance. He was also very influential in the development of ACUTA’s first presence on the World Wide Web.”

When Mordosky began working in university administration, it was not in the telecommunications field, but rather in the field of food services. “He pioneered many changes in that field by recognizing the value of technology and introducing it into his department’s operations,” said Tanzi. In 1981, Mordosky left food services to enter the field of information technology. He quickly began his ascent to leadership in higher education telecommunications. In 1989, on the first day that he had responsibility for telecommunications, he attended an ACUTA seminar.

“Tony Mordosky is widely respected within our association,” Tanzi declared, “as a person who can take on the tough, transformational assignments and complete them with insight and intelligence.”
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Professionalism, Dedication, and Resolve

Jeri A. Semer, CAE

More than two months after the tragic events of September 11, the full long-term impact on our personal and professional lives of the events of that date and their aftermath is yet to be determined. We continue to see rapid developments around the world and within North America, continuing uncertainty in the economy, and potentially long-term changes in the way that people conduct business.

We are beginning to see the ripple effects of 9/11 in reduced state revenues, resulting in budget reductions for many public colleges and universities. At the same time, ACUTA members are demonstrating their professionalism, dedication, and leadership qualities by determinedly moving forward to strengthen services and security for students and their institutions. As reported in the ACUTA News and on the list serve, telecommunications and information technology staff were indispensable to their institutions in the immediate aftermath of the terrorist attacks. They played an essential role in reestablishing and maintaining communications, creatively overcoming incredible obstacles to keep administrators in touch with campus communities, parents in touch with students, and staff in touch with their families and co-workers.

Several campuses also served as emergency backup locations for public safety agencies, community service agencies, media, and other higher education institutions. These complex arrangements were completed with virtually no advance notice, with telecom and IT professionals working virtually around the clock to make it happen, on top of their other extraordinary duties to keep campus communications channels operational.

Much has been learned about disaster planning and recovery in the past few months, and our members have been generous and open with each other about sharing insights, successes, challenges, and lessons learned. ACUTA members should be proud that, for the most part, their carefully constructed contingency plans worked very well and communications (both voice and data) were maintained.

Shortly following the events of 9/11, we made a decision to add a session to the Fall Seminar agenda, “Disaster Planning: Lessons Learned from September 11.” The session featured ACUTA members from campuses near the disaster sites in New York and Washington, D.C., as well as other ACUTA members sharing their disaster planning and recovery experiences. This was the highest-rated session of the entire seminar, based on attendee evaluations. Because many of our members could not attend the Fall Seminar in Albuquerque, we have produced a full transcript of the session, along with notes summarizing the highlights, and made them available on the ACUTA Web site. I would encourage you to check these resources at www.acuta.org.

ACUTA will continue to respond to heightened interest among our members for information on critical security and disaster planning issues. Even before 9/11, our research showed that this was a topic of major interest for professional development. Look to our publications and future educational sessions to continue to cover these important areas. And I encourage you to continue to share questions, solutions, and ideas with other members through the list serve.

In the corporate community, many of the vendors that ACUTA members work with are experiencing staff reductions and budget cutbacks, and some are even leaving the higher education market. For example, of 152 ACUTA corporate affiliates in 2000-01, we know of at least 16 at this time—more than 10 percent—that are out of business or no longer in the education market. I believe it is safe to assume that there will be further ramifications for our corporate members. Yet, many companies continue to demonstrate their commitment to their higher education customers by participating actively with ACUTA and supporting our events. Please express your appreciation to these companies when you see them in the exhibit hall or on the pages of this Journal.

Finally, in these stressful times, we all need to remember to stop and say thank you to those on our staffs who have extended themselves to make extraordinary contributions to campus and community. In many cases, their efforts have been at the expense of time with family and loved ones, during a time when personal safety and security concerns were heightened. And I would like to express thanks to you as ACUTA members for your outstanding leadership in a difficult time, and for continuing to support and participate in your professional association.
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