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EDITORIAL

Operated by the Texas A&M University System (TAMUS), the Trans-Texas Videoconference Network (TTVN) is currently the nation's largest university-operated two-way interactive digital video communications network. In this issue of DEOSNEWS, Larry Dooley of the Center for Distance Learning Research reports on the development of this multi-campus, multi-agency system, discusses faculty concerns related to this form of distance delivery, and offers a number of recommendations for appropriately and effectively using compressed video for instruction in higher education. Readers interested in this medium may want to read an earlier DEOSNEWS article, "Teaching via Compressed Video: Promising Practices and Potential Pitfalls" (filename 94-00062) by Mary Alice Bruce and Richard Shade. (Directions for recalling this and other back issues of DEOSNEWS can be found at the end of this issue.)
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INSTRUCTIONAL USE OF COMPRESSED VIDEO TELECONFERENCING: A REPORT FROM FACULTY USERS

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INTRODUCTION

When interactive video teleconferencing was first announced at the 1960 World's Fair, it was touted as an innovation that would be readily available on a wide-spread basis in the near future (Spiller 1985). However, teleconferencing subsequently was made available to only the top businesses that could afford the exhorbant price tag; certainly, it seemed, education could never enter this market! To the layperson, traditional modes of education were based on the need to gather around the scarce resources of a learned

person and printed thought (Rogers 1990). Today, the world of recorded knowledge is richer, more spontaneous, and more transportable than it has been in the past.

In 1990, for the first time, the nontraditional student became a part of the majority; more than one half of the college students in this country were over 25 years of age. Students today are busy, working adults with a great many demands on their lives (Rogers 1990). For education to compete in this arena, it had to make the transition to the high-tech marketplace. Education is now in distance learning in a big way.

What really is this term "distance learning," anyway? Keegan identified four essential elements of a distance learning program. The four elements include: (1) the separation of teacher and student during most of the instructional process, (2) the influence of an educational organization and the provision for student evaluation, (3) the use of educational media to carry the course content, and (4) provision for two-way communication. At the most basic level, distance learning takes place when physical distance separates the teacher and student, and technology is used to bridge the instructional gap (Willis 1993).

Penn State can claim one of the oldest distance learning networks. Started in 1886, it used state-of-the-art technology (U.S. Mail) to deliver courses in drafting. Today, Penn State is the home of the American Center for the Study of Distance Education and has advanced its communications techniques far beyond the mails, although the post office still is used (Harler 1991). However, as of April 1992, there were 11 universities in the United States that offered distance learning program. Most of the degrees offered through these programs were at the master's and Ph.D. level (Miller 1994). The Department of Educational Human Resource Development at Texas A&M University is one of these eleven.

These programs are not limited to universities, as Mind Extension University (MEU), which began cablecasting in 1987, now reaches 23 million homes and is carried by 767 cable systems. MEW also sends videotaped courses to people without cable access. Students can take interactive high school courses, complete bachelor's degrees, or even earn master's degrees by watching cablecast or videotaped courses (Piirto 1993). Additionally, the TI-IN Network of San Antonio, Texas, was one of the first commercial companies to sell distance-learning products. It offers interactive live satellite courses in math, science, and foreign languages to 650 U.S. high schools (Piirto 1993).

HOW COMPRESSED VIDEO WORKS

Compressed video is a technology that enables live, two-way auditory and visual signals to be transmitted simultaneously among sites which are equipped with specialized equipment. Using this specialized equipment, compressed video signals can be sent over fiber optic or other telephone lines, by satellite, and by microwave transmission, usually at costs substantially less than those associated with other types of live, two-way transmissions (Cochenour 1993).

Video is the picture portion of a televised presentation and is an electronic signal composed of moving frames of information

transmitted at a frequency range of 1 to 6 megahertz. (Megahertz is a radio frequency term meaning one million cycles per second.) The term compression refers to the process of reducing the representation of information without reducing the information itself and has the effect of lowering the time or space necessary to store or to transmit the information. Video compression involves processing the analog television signal digitally. Analog signals are continuous, much as a clock has hands that sweep along a continuous scale. An analog signal can vary in strength at any moment in time, and the signal directly and proportionately creates the display on the screen.

A digital signal is not continuous, but rather is discrete--it is either there or it is not. A digital signal is really a string of digits transmitted in abrupt, distinct increments at a very high rate of speed.

The major difference between compressed video signals and traditional signals broadcast over the airwaves or sent over the telephone lines it that the visual and auditory information delivered by a compressed video signal is edited during the transmission process and only new digits are sent.

At one-tenth the operating cost of one-way broadcast conferencing, the digital video technology delivers roughly the same visual image--and adds to it face-to-face, give-and-take interaction from two-way monitors in as many as 16 sites at one time. It also can include computer, recording, and film/document/slide-projection capabilities (Quinn 1993).

THE TRANS-TEXAS VIDEOCONFERENCE NETWORK

Prompted by the expansion of The Texas A&M University System (TAMUS) from four universities to eight, Texas A&M University began working in 1989 with GTE Southwest to assess the feasibility of implementing a state-wide, high-speed data and videoconferencing network. Consolidation of costly leased data links and connection of computing resources at the far TAMUS campuses became a high priority for the uniform management and exchange of information in both the administrative and research sectors. Digital, compressed video two-way interactive videoconferencing service provided a convenient avenue for meetings and classes with signals which travel simultaneously on the same telecommunications links as computer data (Staff 1991).

Construction of the TAMUS Interactive Services Data Network began in early 1990 with funding authorized by the presidents of the system universities, which include Prairie View A&M University, Tarleton State University (Stephenville), Texas A&M International University (Laredo), Texas A&M University-Corpus Christi, Texas A&M University at Galveston, Texas A&M University-Kingsville, Texas A&M University (College Station), and West Texas A&M University (Canyon). Also collaborating were the directors of a number of state including the Texas Agricultural Extension Service, the Texas Agricultural Experiment Station, the Texas Engineering Extension Service, the Texas Engineering Experiment Station, The Texas Veterinary Medical Diagnostic Laboratory, the Texas Transportation Institute, and the Texas Forest Service.

For transmission of videoconference signals plus data between

university computing centers, a system of land-based T-1 telecommunications links were leased through GTE Southwest and ATC Telecommunications. T-1 lines are essentially high-capacity, high-quality telephone circuits which provide cost effective 24-hour service. T-1 telecommunications utilizes a combination of fiber-optic, microwave, and standard telephone technology to provide a 1.544mbps bandwidth which accommodates the 768kbps videoconference data stream and a variety of data channels for computing services.

Therefore, TAMUS became the first institution of higher education in Texas to implement a major digital videoconference network in the spring of 1991. The Trans-Texas Videoconference Network (TTVN) is currently the nation's largest university-operated two-way interactive digital video communications network.

The TTVN continues to be the fastest growing academic videoconference network in Texas. During the fiscal year ending August 1995, the network carried 3,354 videoconferences and 424 telecourses; to date, the network has carried 11,995 different videocinferences (Staff 1995). Twelve new videoconference facilities were added during this fiscal year, bringing the total to 66 facilities in 30 Texas cities and towns (prior to the end of this calendar year, the network will comprise 83 different sites located across Texas and Mexico. These installations are attempting to meet the increasing demands of distance learning activities. Several TAMUS campuses have installed a second videoconference system to accommodate their extensive telecourse schedules.

A variety of people affect the success of a compressed video experience. People who formally or informally make up the team responsible for compressed video sessions may include those from organizational management or administration, instructors, technicians, distance site facilitators, and students or participants. One must consider details such as scheduling, registration, course credit, teacher evaluation, distribution of learning materials, session funding, room location, and access to hardware. Too often many of these administrative and managerial details are overlooked; pre-planning in these areas is a key to success.

This network was established to provide instructor-operated, high-quality educational telecommunications without the need of an on-site technician. All of our professors operate all phases of the in-class equipment. There is, however, a systems operator for the overall maintenance and management of the network. Our 36-site system has a technical staff of three individuals. In most cases, professors are alone in the classroom to operate the cameras, VCRs, multimedia presentations, and the overall classroom management.

FACULTY CONCERNS

Although satisfying the intent of the administration for providing instructor-managed educational telecommunications classes, it became apparent to this instructor, after using this network for three years, that there was a critical shortage of support for faculty and, especially, for adult students using this system. In December of 1993, the author approached the Associate Vice Chancellor for Information Resources of The Texas A&M University System about the need to examine the support services available and to recommend

potential additional services to support faculty and students in instructional delivery. Based on input from faculty at various campuses in the TAMUS, the following recommendations are made:

There should be someone at the remote site(s) who knows, and can troubleshoot, the equipment, as well as operate the cameras. This person can also proxy classes by being responsible for collecting assignments and other duties, as assigned by the instructor.

All electronic classrooms should have access to the Internet and have a computer in the room that can be used for multimedia presentations. These computers should be compatible with either Macintosh or PC platforms.

There should be some time available on the network, outside of scheduled class time, for on-line office hours. Students should have the opportunity to give feedback to the faculty at times other than class time and without the necessity of a long-distance telephone call.

It is important that e-mail be made available to all faculty and students to ensure that contact with professors is maintained.

There should be an additional allocation from departmental operating funds to departments that have faculty teaching distance learning classes; additional expenditures are required over and above what the current formula allows for traditional courses.

Class facilitators should be available for the duration of each class, and these persons should not be registered as students. Work-study students could be hired for this purpose from the additional funds recommended to be allocated to Departments teaching through educational telecommunications.

A computerized system should be established whereby one call could schedule a meeting/class on the network, reserve rooms at all sites, and coordinate times for the meetings. Often multiple calls are required to schedule the network and each site.

Library and other support materials needed for classes should be provided by the host site. This could include an 800 telephone number, overnight delivery, fax and Internet address for students. Students should be able to access all items in the library just as if they were local students.

There should be a time at the beginning of each semester to provide a hands-on student orientation to the distance learning classroom and technologies. A training session for the students should be initiated that would include a handbook/manual that can be referred to later.

An additional network room should be available on each campus where instructors can practice without tying up the system; there should be increased hours of availability of these rooms.

The administration should bring together faculty who have taught, or are teaching, on the network to dialogue with other faculty about "best practices" for distance instruction.

A standard evaluation instrument should be used to evaluate course expertise and professor performance. This instrument should be different from the one used in traditional classrooms.

Faculty need to be trained and this does not mean in how to turn on the equipment, but rather in using the advantages of the system. Additionally, administration should provide faculty with access to curriculum specialists who can modify faculty syllabi for distance delivery. Most faculty use the same instructional design for the distance learning class as they do for their traditional classes.

If educational telecommunication-delivered courses are to be successful, it is necessary for all the involved sites to adopt the same semester calendar.

Each site should have classrooms dedicated solely to videoconferencing, or at least have network activities take precedence over all other scheduled activities in these rooms.

Registration of students at distant sites should be studied. How is admission handled? Are support materials mailed to distant students prior to class?

A target class size should be established. Both minimums and maximums are critical for planning purposes. Where is the break-even point? Classrooms should be designed so that the entire student population in the room can be viewed at one time. All monitors should be at least 35" for adequate viewing.

Calculation of faculty load for those teaching distance learning classes is a major concern. Individual faculty should receive credit for the total number of students they are teaching, regardless of where they are registered. Moreover, professors should be given some extra incentive for teaching distance learning classes.

Universities must distinguish between resident courses taught at a distance and those taught locally.

The administration should study all courses and decide which courses should be taught by distance learning.

RECOMMENDATIONS

Distance learning is no longer a marginal part of higher education; it is becoming an important means of providing access to educational opportunities and resources. Moreover, the dramatic rate of change in information is forcing us to realize that we don't need an "educated" population, but rather that we need to become a nation of learners who combine work and education. Learning must become an active and ongoing process rather than a test of memorization

skills based on some acceptable list of core knowledge (Rogers 1990).

When taking these next steps in the process of managing existing educational telecommunication systems, it is critical to involve leaders at the highest levels of the organization. Faculty, however must be involved in the governance of these systems, and the introduction of telecommunications-based education should be a collaborative effort. A successful process-created team is one weighted toward professionals who can best consider the non-technical questions that are asked (Duning 1993). One must place the learners' (customers') needs ahead of organizational convenience and at the center of planning and decision making.

Currently, most organizations create telecommunications-based educational programs in an ad hoc fashion. In the absence of adequate instructional design support as a resource for instructional environments and, in particular, for educational telecommunications systems, learning packages tend to be created by (1) an AV specialist who translates traditional instruction to fit the medium, (2) an educator who directs the AV specialist to accommodate the instructional style demanded, or (3) a tense fusion of the two (Duning 1993). Educators working in this ad hoc fashion have been doing something for which they were not hired or trained. Moreover, the organization's incentive system was not devised to reward them for such tasks.

The shifting priorities this new distance learning paradigm provides uncovers a basic organizational principle of which we are all aware: management problems are rooted in the long history of the academy and moving toward change must be incremental to be effective.

This author suggests that most organizations have not adapted their units to accommodate the opportunities and impact of educational telecommunications. Most are still trying to force their traditionally delivered classes into the mold of electronic delivery. In the long run, this will not be effective.

It is suggested that each campus establish an academic instructional design unit to assist faculty and instructors in distance learning course development. Instructional design can be a valuable and integral part of the telecommunications-based education (Duning 1993). A major rationale in support of an instructional program is the current practice of diverting subject matter experts (SME) from instruction to design work, which often is not the best use of valuable resources. An separate instructional design unit would free the SMEs to do their job of teaching.

Regardless of the course taken, teaching faculty should not be expected to be the content specialists, curriculum designers, and technology specialists. The compressed video equipment on the market today is designed for individual faculty and instructors to operate while teaching. However, in this day of the technologically informed student, we can no longer afford to offer classes that merely place traditionally prepared material on the network. Our instructors can indeed operate all the equipment; however, they must have high quality material to deliver. Our clients are requiring a product that rivals what they see coming from business, television, the cinema and other commercial markets. As colleges and universities in the future will no longer control all access to

knowledge, we will find ourselves competing for students with other entities such as the telecommunications and entertainment industries. Education, therefore, must embrace this new paradigm or be left behind.

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