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EDITORIAL

Distance education delivery systems are characterized by widely varying levels of technological complexity. Newcomers to the use of distance delivery systems in education are often attracted to "high-tech" (and high cost) interactive television (ITV) systems, overlooking less glamorous alternatives that offer equal educational effectiveness at much lower costs. One such cost-effective alternative is compressed video delivery, which uses telephone lines to transmit two-way audio and video signals to multiple sites. In this month's issue of DEOSNEWS, Mary Alice Bruce and Richard Shade present a description of a compressed video system used to deliver teacher education coursework at a distance. The authors discuss the benefits of this technology, provide suggestions for its successful implementation, and report on student and faculty perceptions of the effectiveness of this form of distance delivery.

TEACHING VIA COMPRESSED VIDEO: PROMISING PRACTICES AND POTENTIAL PITFALLS

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INTRODUCTION

Unique opportunities emerge as educators utilize new telecommunications technologies for the delivery of instruction to distant learners. Compressed video delivery systems are one example of such technologies. A compressed video system can overcome geographic constraints, link remote locations, and form effective partnerships among educators, business, government, and communities (Barr, 1990; Hobbs, 1985; Tift, 1989). Innovative use draws upon resources and diverse expertise of participants and role models, responds to increasing adult education demands for continuing education and retraining, and facilitates widespread support networks. According to Tift, learners "like and learn as much through well-designed

technology-based distance education programs as through conventional programs" (p. 37). Such a changed environment seems to offer promising rewards and presents new challenges for teaching and learning.

This article acknowledges the evolving potentials of compressed video, addresses its constraints, and presents strategies to maintain quality education using this new technology. The authors will analyze the differences between traditional teaching and learning versus that of a compressed video classroom, provide proven pedagogical methods and techniques, and discuss how to effectively structure student interactions into a successful course delivered via compressed video.

METHODOLOGY

During Fall 1991, U.S. West Communications awarded the College of Education at the University of Wyoming a three-year grant for the Video Education Interactive Network (VEIN). One goal of this grant was the development of a coaching/mentoring model for teacher interns and a subsequent support system for first and second year teachers in the state. The model took the form of a course and the support system a "network", all of which was to take place at a distance using compressed video.

The team for the Coaching/Mentoring of Teacher Interns, comprised of four University of Wyoming College of Education faculty and four public school teachers from the XXXXXX School/University Partnership member districts, met via compressed video to develop the coaching/mentoring course. Sixteen public school teachers from four school districts located up to 300 miles from the University campus enrolled in the semester pilot course. In an attempt to bridge the real or perceived gap between theory and practice which exists in teacher education programs, the 8 instructors and 16 classroom teachers investigated topics essential to successful coaching/mentoring of preservice teachers, as indicated by a needs assessment and extensive literature review. Topics included coaching/mentoring models and issues, data collection techniques, reflective thinking strategies, and interpersonal skill development.

Weekly questionnaires completed by both students and instructors produced formative and summative data regarding course content, instructor delivery of material, and the medium of delivery (compressed video). Closed questionnaire items (a five-point Likert scale) included rated assessments of the perceived quality of learning activities and resources, facilitation of learner involvement, instructors' ability to demonstrate and train students in new interpersonal skills and teaching techniques via compressed video, and instructors' knowledge and skill level to make productive use of the technology. Open questions enabled respondents to explain their level of satisfaction with the course related to specific instructors, the least and most helpful aspects of that day's class, and suggestions for improving the course. The data collected facilitated specific modifications in teaching and learning strategies using compressed video as a delivery system.

RESULTS

Critical factors which emerged included site logistics, equipment,

microphone issues, leadership, nonverbal and verbal communication, enhancement of interpersonal skills, the issue of "control" for the instructor, information dissemination, media, site involvement, and variations in teaching skills and instructional strategies. The authors report their first-hand experiences teaching via compressed video, which reflect potential problems and possible solutions. Relevant comments from students' formative and summative evaluations are included and address these suggestions.

Site Logistics

Numbers of sites and numbers of participants at each site can vary every time an organization conducts a meeting or an institution offers a class. As numbers increase, management issues are compounded. One instructor remarked, "I appreciate teaching this course with 16 students located at four sites, as compared to 24 students last semester located across eight sites. It's easier to get and maintain their attention, conduct discussion groups, and stay on task when handling four sites rather than eight." A preventive strategy calls for an instructor to establish frank communication with technicians, site contact persons, site coordinators, and students to explain the system. Technical problems can be alleviated with a combination of knowledge, experience, humor, and patience. One instructor began the initial session by stating, "With the convenience of distance learning comes the possibility of new inconveniences. Social connections are much easier in person. Let's all be patient as each site comes on-line and we greet them. We also must be understanding if we have mechanical difficulties as well." However, one student commented, "I did feel frustrated with the amount of time lost due to technical delays."

In this pilot course, the instructors chose to limit participation to four sites with four students at each site. Such numbers enhanced possibilities for dyad and group interactions within sites and across sites. For example, one instructor told students, "Break into pairs. Each describe to your partner a conflict in which you are presently involved and would like to resolve." Even numbers allowed students at each site to interact, then combine as foursomes for problem solving. Cross-site discussions with one person from each of four sites formed an effective long distance group. As future planning occurred, instructors decided to build upon successful experiences and offer the course to eleven sites, with unlimited participation. Attempts to identify and control for limiting factors which might inhibit effectiveness provided the impetus for such a decision.

Students at remote sites valued the exchange of ideas, debate of professional issues, and new collegial relationships made possible by the technology. Several students expressed a desire to have fewer sites in order to become better acquainted with classmates. One student wanted fewer sites to have a "longer time to interact with other students." Another appreciated "different perspectives on issues." Although some expressed a desire for fewer sites, the decision was made to expand the network as the next step in the plan to offer the course throughout the state.

Equipment

The numbers of cameras, monitors, VCRs, microphones, and other forms of technology can vary greatly among sites. Some have one camera, others two or more. Some sites have a ceiling camera for graphics, while others employ visual presenters. Some sites have at least two monitors, one showing the outgoing signal, one or more showing the incoming signal. Sites may also have several monitors, yet only broadcast the incoming signal to participants.

Pushbutton microphones, omnidirectional mikes, "bug in the ear" cordless mikes, and open mikes are options. Instructors or technicians, and sometimes learners or site coordinators, operate the equipment. The system utilized for this course included incoming and outgoing monitors, instructor and learner operated technology, and pushbutton and omnidirectional microphones.

In this course, the novelty of the interactive television technology enticed some learners to enroll in a compressed video course. However, the excitement of seeing oneself televised was initially unnerving for some students. Course learners and instructors adjusted their hair and clothes, then continued to assess themselves. A study of audio-conferencing by Burge and Howard (1990) reported that the equipment inhibited the students. On the other hand, the Hawthorne Effect (Borg & Gall, 1989) seemed to help students in this course handle the new challenges of compressed video with increased motivation and performance. After three weeks, students expressed comfort and acceptance of the cameras.

When a course or meeting involves only two sites in the loop, monitors display students at both sites. Interchanges seem fairly natural. However, when multi-sites are on line, the monitor rotates either by automatically "autocycling" (rotating to another site every 20 seconds) site to site or via audio activation to the site with loudest voices. As a result some sites may seem to monopolize the signals. Omnidirectional mikes necessitate attention to the use of the mute option to avoid echoes and allow more balanced interactions.

Sites may or may not have a technician operating the cameras. Whatever the situation, the instructor can cue everyone for orderly transitions. For example, "Let's take a look now at our outline today" can be a cue to look at written media. "The group here is ready to present the advantages and disadvantages of the Brief Counseling Model" signals a camera switch to capture the entire group. Instructors can describe their behavior and intentions to prepare students, thus creating a sense of order.

Microphone Issues

Students complained that technology stifled their spontaneity for a variety of reasons. Sites with push-button microphones seemed especially prone to trouble, as Burge and Howard (1990) report regarding audio conferencing. A number of students remarked, "I don't like to have to lean forward to push the button and talk every time." Others added, "It's just not as easy as a usual class discussion. More effort has to be made to talk to all sites. So we just talk among ourselves." The site with omnidirectional mikes was more conducive to normal interaction among students within and across sites.

"Chiming in" with a question or comment by instructors or students during the class session bordered on a competition. Asking questions seemed more valid than interjecting comments. "I really have to plan my responses and be ready for a pause in the discussion, so as to break in," commented one student. Another student said, "Sometimes I am frustrated trying to find the chance to tell my thoughts. After I have the floor, I feel I'd better make it worthwhile." To encourage student interaction, the instructor can take specific action related to classroom management.

Leadership

The instructor must facilitate courtesies and protocol for questions, responses, and comments. Addressing each site or person can be helpful. "Any comments from those in (XXsiteXX) concerning adult learning theories?" or "Tammi in (XXsiteXX), do you or people in your group have questions or comments?" Next the instructor can say, "Let's see if there are concerns from the other sites, first to (XXsiteXX)?" Ask students to introduce themselves by name as they express ideas. For example, "This is Mary Jo in (XXsiteXX). I have found that . . . " The use of a group site photograph can cue the instruction.

Modeling such structured openness demonstrates to students the behavior expected during a class discussion. Just as the instructor offers feedback and encouragement in a traditional classroom, it seems even more important to verbally acknowledge, confirm, and offer alternate points of view to learner contributions. Cyrs and Smith (1990) purport discussions need to be "well structured and defined with clear time constraints" (p. 200).

Checking for understanding is possible by means of the usual indicators. For example, an instructor might say, "Let's take a minute mentally to gather thoughts on this, and then I'll call on someone to summarize the major premises of utilitarian moral philosophy." Delayed sound, plus thinking/response time and microphone handling extend interaction time. Suggestions from participants of Burge and Howard's (1990) audio-conferencing class include emphasis on processing time. Heinzen and Alberico (1990) urge the necessity of periods of silence for creative, reflective thinking. Obviously, the instructor must plan for the extra time which questions and critical analysis consume relative to a traditional setting. To maintain the quality and quantity of knowledge disseminated, the learner may be called upon to complete additional readings in order to achieve learner outcomes designated for a course or program within a specific time period.

A proactive instructor gives concise directives, speaks clearly, paces sessions, monitors length of learners' responses, clarifies, and synthesizes learners' responses. Use of signs on the screen (e.g., "7 minutes to go!") indicating time remaining for discussion helps prompt action. Time management creates a professional, respectful atmosphere among students. This is true for any instructional setting. Adapting these specific strategies to the compressed video classroom is the challenge.

Nonverbal and Verbal Communication

As in a regular classroom setting, the teacher must establish interpersonal rapport with students, both individually and

collectively, as soon as possible. This goal can be more challenging when students are in locations hundreds of miles apart. Tift (1989) reminds instructors they are not able to take advantage of the usual face-to-face encounters in and out of the classroom with friendly nods and waves, as well as individual acknowledgements and comments. Bruce, Shade, and Yocom (1993) encourage instructors to be sensitive to learners' social and emotional needs. A sense of belonging and caring may not be obtained as easily because reduced visual interaction allowed by monitors inhibits rapport with students. Kinesthetic cues which help to facilitate spontaneous interaction--such as leaning forward to speak, raising a hand, nodding with responsive eyes, and opening the mouth to participate--become minimized in this learning environment. Learners yearn for traditional visual connection with comments such as, "If we could see all the other people when we are talking, the conversation would be easier."

Instructors gradually realized the increased importance of auditory factors. When addressing students, warmth, sincerity, and affection can be demonstrated in actions and voice quality (pitch, tone, volume, pausing, and pacing). As one instructor taught facilitative communication skills, she observed learner practice to be focusing intensely on imitating her voice tone. "I wasn't aware how overwhelmingly important our voices have become due to absence of other factors." Feedback from learners indicated auditory dynamics to be crucial in establishing environmental climate. A voice tone communicating vitality and enthusiasm generates warmth and projects a positive self-image (Truax & Carkhuff, 1967). Voice animation, energy, and enthusiasm seem especially crucial for motivation in distance learning.

Enhancement of Interpersonal Skills

Sigel (1991) speaks of the separation which occurs automatically as a student views a picture of a person, a representation of reality rather than a real person. Depersonalization may occur due to lack of physical contact with individuals at other sites. Learners tend to see the instructor as an object on a screen and distance themselves from the instructor.

The instructor can utilize specific strategies to create a climate of trust and active learning. Perhaps most important is addressing affective issues directly. "During this time together we shall learn together, debate issues, synthesize knowledge, evaluate our action plans, plus enjoy knowing each other as colleagues. We'll have to work a bit harder to understand and encourage each other across these distances." Learners in this course especially appreciated and acknowledged instructors who were "so personable, displayed interest in each of us", "caring and concerned about each of us", "empathetic to individual needs and ideas," and "treated me as a professional." These instructors tended to address learners by individual name and refer to ideas and actions various learners had shared in class. Learners felt uniquely special.

Other methods to enhance interpersonal support include an initial face-to-face meeting to build rapport, times during class for processing human interactions, exchanging individuals' journals among locations, and cross-site role plays to link class members so that human relationships can develop. Burge and Howard (1990) also mention the use of humor to create trust among

participants. The use of appropriate humor is also effective not only in establishing a warm, receptive learning environment, but also in enhancing the climate for creativity, brainstorming, risk taking, and anxiety reduction at each site. Relevant personal vignettes, anecdotes, and experiences tend to enrich short lectures. Teasing and using surprises across sites are examples of humor which can link class members. Cartoons and newspaper comic strips on camera can bring human warmth to the setting. One learner commented, "We need to remain human and not 'canned'."

Issue of "Control" for the Instructor

The issue of "control" will vary with each instructor. In a traditional classroom, instructors can monitor the environment. They see and hear all, even when 20 or 30 students are present. When students are located at more than one site, the camera can only "see" one site at a time. Therefore, the instructors can see only the students at their site plus those students at one additional site on the monitor. Students at other sites are "off-camera." The instructors have no idea if they are attentive. If students "mute" their microphone, they cannot be heard. An instructor can be presenting information and suddenly the camera autocycles to a site where all the microphones are muted while the students are talking and laughing. This can be extremely distracting and disappointing to the instructor.

The nature of the system allows site participants to talk among themselves. Wallin (1990) reports distant-site learners' tendencies to conduct conversations during class presentations. Depending upon the system, participants at various sites may observe others yawning, talking, daydreaming, eating, and clock watching. Site participants may focus the camera on a small group of students who perform, while others take a passive role.

In this course, such behavior resulted in frustration for instructors as well as ill feelings and disappointment among students. Some accused others of "spying." One commented, "Panning of sites was not in good taste." Same-site students became aggravated with each other for talking during presentations. Instructors worried about "losing control" and "having no control." Open communication served as a tool for review of the system's capabilities and expectations of behavior. Students who expressed a need to talk during class designated an out of classroom location for off-subject interaction. Instructors became more adept in engaging learners and balancing involvement of students.

Written Materials

Course Readings/Syllabi. The use of advanced organizers (such as outlines and worksheets) in any form can capture attention, provoke interest, and free the visual learner from detailed notetaking. Organization and distribution of relevant readings before the initial class is essential to support learners as well as establish credibility and respect for the instructor. Materials must be logically correlated to class sessions and offer flexibility. Course schedule, expectations, assignments, criteria for evaluation, handouts, as well as procedures for communication and assistance among students, site coordinator, and instructor should be a part of the course packet.

For this particular course, instructors distributed a course manual to each student to offer an overview of the course and build expectations of class climate. Instructors tried to include all essential materials in the course manual. The manuals contained the course syllabus with goals, learner outcomes, self-assessment instruments, and professional information about the instructors as well as a humorous or personally insightful sentence about each instructor. (If similar information can be obtained about students, it could be included as well). Students were located at four different sites, three of which were not near a research library; consequently, the manual included all supplementary readings.

As instructors presented material from different modules, the students expressed their need to have overheads in the form of handouts to more easily follow the content delivered. An outline or copies of overheads for each class session allows students to conceptualize material and take notes. Depending on the site situation, the small screen of a television monitor may be difficult to see. The instructors had not foreseen the need for material traditionally used for overhead projectors to be distributed to class members to facilitate comprehension.

To meet these unexpected demands for learning material, instructors tried to send all supplemental print material prior to weekly presentations. Faxing and mail delivery became often used services for material exchange. However, mail service did not allow quick, timely exchange of needed materials to remote locations. Small amounts of material were faxed, but some site coordinators had to make special trips as far as other towns to receive faxes. It was frustrating to handle all the paper, since everything had not been combined in a package ahead of time. One instructor commented, "It's a paper chase, and I feel unorganized with so much floating."

Other Media

To add visual interest, instructors made use of various media. For this course, instructors had been told to utilize any hard copy, overheads, and video tapes. Instructors quickly learned hard copy needs to be 18 point bold font (or larger) for learners' monitor reading. Instructors easily could enlarge cartoons and other items with an 8x11 ratio, yet had to manipulate pictures of other dimensions for use on the visual presenter.

One surprise was the use of student-made video tapes which resulted in compressed motion (slower motions) to all sites when played. The tapes were understandable and usable, although students remarked, "What an effect; everyone's lip synching." Commercially prepared video tapes were usually not as problematic. However, second generation (copied) tapes often resulted in poorer quality, excessive compression of movement, and unsynchronized speech. The commercial tapes, often effective in the regular classroom, can be utilized over compressed video and viewed simultaneously at all sites. Copyright law varies regarding commercial use of videotapes to multiple sites (Bruce, Shade, & Yocom, 1993).

Site Involvement

The instructors of this class had to remember to involve "on-site" students. Sometimes an instructor attempted to include those at distant sites at the expense of students on-site. Instructors learned to think of the camera as another student. One camera was placed next to the monitor to facilitate eye contact with other sites. As students looked at the monitor, they appeared to talk to distant learners. A second camera was placed to capture the entire group in full body view. Switching cameras offered visual variety and allowed sites to view each other during discussion times. For this course, instructors chose to sit with the group of students rather than to face the students. One instructor remarked, "I tried to look at all students, not just remote learners or only those in the room." A posted sign indicating site location is a helpful cue to distant students' identification and inclusion. The instructor must look at the on-site participants as well as look into the camera and talk to the students "out there," engaging all sites and all students.

Surprises

To begin each class the authors found the use of "surprises" to be very effective. On a rotating basis, each site was responsible for initiating the session with a surprise for classmates. This set the climate of the class and gave students ownership in each class session. Examples of surprises included students wearing masks, putting baby pictures of themselves on the visual presenter and asking participants at other sites to guess who's who, singing a round with all sites, and displaying cartoons or humorous artwork on camera. One student wrote, "I enjoyed the surprises, added spark to the class."

Moderator

With more than one instructor, a moderator to facilitate each class session helped insure a smooth flow and transitions, especially when different topics or activities comprised each class session. Rotated among sites, the moderator can be a different student volunteer each class session. It's almost as if the class originates from a different location each session. This also keeps the students on task and minimizes tangential discussion. The moderator can begin each class with a formal "welcome". This signals the start of the class and allows the instructor the opportunity to acknowledge any guests or observers present. The "welcome" may vary in nature and is important in setting the climate.

Reflection.

When the "welcome" and "surprise" activities are completed, a short period of time for a reflective summary is very beneficial. Time, coupled with the great distance, often causes students to forget material as well as "where are we going with this class and where are we now." A reflective summary allows students to discuss factual events of the previous class, reflect after a week to continue to process the information, and discuss how they now feel about it. It also, in a very practical manner, brings anyone absent the previous week somewhat up-to-date.

Summary

Each class session should end with a "wrap-up." This can be a

review of what actually happened in that day's class or it can be more reflective and evaluative in nature, such as "What are three things you know now that you didn't know before?" This is also important in distance learning, as the "before" and "after" class time with the instructor and students at the other sites is often not as feasible as in a regular classroom situation.

Student Contact

The establishment of a toll-free telephone number and/or special office hours for student convenience is essential in maintaining student contact. Students are not "on-campus" and cannot always meet during the instructors' normal office hours. Additional aids include answering machines, a secretary to take messages, and electronic mail.

Although it is not always possible, a wonderful way to improve the essential interpersonal component to a distance learning class is to visit another site and teach a class from there. It is valuable to meet students from the other site in person and to get a different perspective of the "on-site" students and "on-site" classroom. By attempting to implement these suggestions, the very real element of depersonalization can be reduced.

Variations in Teaching Skills and Instructional Strategies

Due to the rapidly increasing number of interactive compressed video classrooms, modifications in customary teaching methods and instructional strategies are necessary. Although the following are all possible to successfully implement using compressed video, instructors must still determine the best teaching method, material, and media to meet learner needs effectively in each specific situation.

Rosenshine's analysis of research (1986) advises instructors to provide information in small components. Ten minutes via compressed video seems to be about the maximum time for a didactic presentation (Ostendorf, 1989). As previously mentioned, an instructor using this method is often viewed as a "talking head." A guest speaker also runs a similar risk. The use of a "guest panel" (several speakers in a panel format as opposed to a single guest speaker) is preferable. This format might ensure more speaker/participant interaction and avoid the "talking head" syndrome.

Learners in this course wrote, "Lecturing didn't seem very effective for long periods of time on one subject. It was too easy for sites not involved to get off task." A second added, "We need less lecture and more processing/reflection time." Wallin (1990) urges "Practice, participation, involvement" (p. 262).

Maximizing the use of class discussions whenever feasible improves interactions among students and can be accomplished in a variety of ways. Formats include analyzing instructor-prepared questions, debating case studies, and conducting brainstorming sessions. Discussions can be within-site (with transmission being temporarily "on-hold"), followed by a return to the class as a whole for summarization and further discussion. Discussions can also be cross-site, with the students at one site discussing the topic with the students in another site over compressed video. The most

versatile and exciting possibility involves forming a "group" comprised of a student from each site. While students at each site form a group and move away from the compressed video equipment for discussion, one student from each site remains at the equipment and proceeds to discuss the topic with others at different sites. Twenty students in four sites can now form five groups of four students each. Additional tips for using a discussion group format include allowing enough time for discussion (limit discussion to one or two issues), remembering to give notice of time remaining with announcements on the monitor screens (such as "three minutes left!"), selecting a scribe in each group to list/summarize and share a visual with the entire class when discussing the topic, plus collecting, summarizing, and faxing group ideas to each site for the next class session.

Role-playing, as with discussions, can be performed within-site or cross-site. Situations, videotapes, and other instructor prompts can be effective starters for a role-play. Careful planning (structure) and time control are essential for successful role-playing. Initially, students may feel uncomfortable "being on TV." Encourage a student to demonstrate cross-site by saying, "I'd like someone from (XXsiteXX) to be a risk taker today, a TV star of sorts, and take part in creating a scenario with me. We'll roleplay a situation to start a class unit on conflict mediation."

Enhanced interpersonal communication can occur through reflective papers. The use of journals can be an effective learning tool. Weekly journal assignments can be shared by students within-site, cross-site, and with the instructor. Student letters to the instructor are another means to connect one on one. Electronic mail can prove an effective vehicle to accomplish these between-class activities.

Individual and/or group projects are also learning activities easily implemented over distances. Individual and/or group presentations related to the projects are also feasible using compressed video. Allow plenty of out-of-class time for the preparation of these assignments. Students must often balance the demands of career, family, and classes. Traveling to meet with other group members creates a more complex situation. Expansion of the traditional time frame is a realistic necessity in distance education.

CONCLUSION

Evolving technology yields exciting opportunities for overcoming geographic distances, thus serving nontraditional as well as traditional students (Hobbs, 1985). The interactive sight and sound of compressed video offers superior advantages to many other forms of distance learning. However, instructors and students must work together to facilitate quality teaching and learning.

Creative use of equipment and same-site/cross-site activities can enhance a diverse, collegial network. Inclusion of all students, modeling expected protocol in behaviors, and effective management of time are essential to build a climate of competency and professional growth. Although the instructional skills and teaching strategies discussed in this article represent good teaching and best practice in any educational environment, the authors' experiences have demonstrated the specific modifications

necessary when employing interactive compressed video technology as a medium for instruction.

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