ABSTRACT
        This keynote speech discusses the rise of
telecommunicated distance education in the United States. Interactive
satellite broadcasts for K-12 instruction are now received by more
than 1,000 schools in more than 40 states. Similarly, many states are
working with two-way interactive television projects, slow-scan
television systems, and microcomputer-based teleteaching. While
correspondence schools once filled a major void for small rural
schools, student motivation suffered because of the lack of "real
time" interaction. Current distance education holds the educational
promise of curriculum equity for students in isolated settings.
Schools that lack enough trained teachers should examine distance
education alternatives. The selection of media is important and
depends upon the goals and needs of the local school. Small school
cooperatives, made up of two to five schools, can be connected by
means of audio, video, or computer linkages. There are advantages and
disadvantages to every technology. Strengths and weaknesses are
offered for each of three systems: satellite TV teaching,
audiographic teleteaching (microcomputer networks), and two-way TV
instruction. Issues to be examined before a system is selected
include: (1) transferring materials between schools; (2) classroom
management; (3) levels of interaction; (4) teacher selection and
training; (5) extent of course offerings; (6) scheduling; (7) class
size; and (8) local control. This document also includes a list of
eight successful distance education practices, ranging from careful
planning to a reminder that course content, not the medium, is most
important to the overall success of a program. (TES)

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DISTANCE EDUCATION TECHNOLOGIES:
ALL THAT GLITTERS IS NOT GOLD

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Distance Education Technologies:
All That Glitters is Not Gold

Distance education is a current "catch all" phrase for any form of instruction in which the learner is separated from the teacher in terms of location, but is linked by some form of telecommunicated medium that permits live, interactive audio and/or video exchanges between teacher and student(s). Instruction is *not* presented in the traditional manner where teacher and students are assembled together in the same classroom, at the same time, to participate in the teaching/learning process.

Interest in telecommunicated distance education has grown so rapidly that it is virtually impossible to accurately document the many projects presently underway or being considered. Only four years ago, interactive satellite broadcasts through the TI-IN Network, Oklahoma State University's Arts and Sciences Teleconferencing System and the Utah State Office of Education's Accelerated Spanish Language program high school credit courses began in Texas, California, Utah, Arkansas, Oklahoma, Colorado, and Nevada. The Utah satellite system is no longer in operation. Yet, TI-IN and OSU have since been joined by the Sci-Star network located at Avon, Connecticut and the Satellite Telecommunic ed Educational Programming Network in Spokane, Washington. Partly as a result of federal Star Schools funding, and certainly as a result of the growing interest in distance education, statewide satellite networks are developing in Kentucky, Missouri, Illinois, North Carolina and elsewhere. In fact, interactive satellite broadcasts for K-12 instruction are now received by over 1000 schools in more than 40 states.

Interest in telecommunicated distance learning is not confined to satellite technology, however. Successful two-way, full-motion interactive television projects delivered via

microwave, fiber optics, or cable are operating between cooperating high schools in a multitude of states. Furthermore, slow-scan TV systems are widespread in many states including Arizona, Wisconsin, Utah, Alaska, and Hawaii. And, microcomputer based teleteaching which links PC's and speaker telephones over regular telephone lines is being used in Utah, Pennsylvania, New York, Alaska, Nevada, North Dakota, and Texas to name just a few states.

Your own state of North Dakota is definitely keeping pace with the interest in distance education technologies that seem to be spreading throughout many rural schools in our country. To me it is exciting to see that programming from Star Schools monies through the Satellite Educational Resources Consortium (SERC) have been received this current year in two of your schools and is scheduled for seven more schools next year. I believe that Public television, through the nation's various PBS stations, has a strong tradition of quality programming. The capability for interactive audio talk-back will be an added component to benefit students that has heretofore not been provided by Public television.

Coming from Texas, I want you to know that it is good to be in a state where the legislature backs up their interest to improve the curricula in rural schools with funding. The $450,000 provided by your 1987 legislature successfully funded 10 pilot projects that has allowed selected schools to link up with TI-IN and Oklahoma State University. I am also pleased to see that some of those monies were used to establish audiographic computer networks, fiber optic TV systems, electronic bulletin boards, and even correspondence study with live audio teleconferencing. I commend your legislature for their foresight in setting aside $1.9 million in funds for technology use in public and higher education. Undoubtedly, these monies must be an enticement for educators to live in North Dakota and endure the long, cold winters for which you are famous. I assure

you that they would certainly entice me.

In the past four months, I've had an opportunity under the auspices of a grant from the Office of Technology Assessment in Washington, DC to travel broadly across the country to observe various distance education programs and technologies in practice at the K-12 level. The final report of that study should be in print in December 1989. The experience has been rich in terms of seeing students -- mostly rural -- learn new subjects and content that otherwise would not be available to them. It is true that traditional correspondence study programs once filled a major void in the curricula for small, rural secondary schools. But most people familiar with this "paper pencil" approach to distance education agree that student motivation (or the lack thereof) and the fact that students cannot interact live and in "real time" with their teacher or with other distant classmates makes this approach overall ineffective for most high school students. On the other hand, telecommunicated distance education delivery, delivered in real-time and permitting live interactive teaching and learning between students and teacher holds an educational promise of curriculum equity to students in geographically isolated settings that has not been achieved through traditional correspondence study. I do believe that correspondence programs can be effective, if they incorporate technologies such as fax machines, scheduled telephone conference calls, etc. In a print based medium that is totally self-paced, however, correspondence study is overall ineffective.

In observing numerous distance education technologies, I've come to the conclusion that their is no one best method or technology that should be used. In all my writing and speaking, I have maintained and will continue to maintain that the ideal situation is to have a well trained and well prepared teacher in the classroom who is certified in the subject area being taught. Due to low student enrollments in various courses or teacher shortages in certain areas, this "ideal" situation is not always possible. Then, the next

best approach is to search for distance education alternatives. Under the right conditions, each technology -- satellite TV, fiber optic TV, slow scan TV, microwave TV, cable TV, audiographic microcomputer teleteaching, audio conferencing, etc. -- can reach and greatly benefit students.

I believe that the selection of the media utilized is important insofar as the goals and needs of the local school are concerned. If a district only has need for a Spanish course, it doesn't seem practical to invest in a large satellite dish and TV receive equipment, join a national network, and pay the annual subscription fee. It may well be more practical and cost-effective to link with a neighboring district and "electronically" share their Spanish teacher via a two-school cooperative by means of an audiographic or slow scan TV network. Small cooperatives have the benefit of maintaining local control of the distance education teacher, curriculum content, scheduling of classes, and size of the class. Successful cooperatives that I've seen have ranged in size from two to around five districts (schools) connected by means of either audio and/or video linkages. These have included two-way TV systems, and two-way microcomputer systems. Audiographics lends itself to small clusters of schools working together cooperatively. If the end desire for North Dakota users is to form a large state-wide network, then it seems that a satellite system would be most practical.

Much has happened and is continuing to happen in the field of distance education. As the technologies become more accepted by local and state educational leaders, we must also recognize that distance education technologies are not an educational panacea. In other words, "all that glitters is not gold." There are definite advantages and there are disadvantages to each technology as well as differences between vendors of respective technologies. Please allow me to briefly highlight what I see as some of the advantages and disadvantages of three of the more popular technologies -- satellite delivery,

audiographics delivery, and two-way full-motion TV delivery. My lists are presented to provoke thought and are by no means exhaustive.

Advantages of satellite TV teaching

1. Students can see the teacher
2. Full-motion video is possible
3. Teacher/student audio interaction is possible
4. Instruction is live
5. Real-time print distribution of handout material is possible
6. Satellite technology can be merged with other media (eg. fax, videotapes, etc.)
7. Satellite signals are distance insensitive -- large geographical areas and many remote sites can be covered simultaneously helping to make the system cost effective

Disadvantages of satellite TV teaching

1. Program offerings are centralized limiting local control by local districts
2. The TV teacher cannot see the students
3. An audio "echo" is often inherent in student talk-back through the TV system
4. Some receive dishes (Ku band) are weather sensitive -- during heavy rains or snows, the signal could be lost
5. The potential exists for large class size
6. There is very limited student-to-student interaction at different sites. The technology seems to chiefly promote teacher-student interaction and not student-to-student interaction
7. Large satellite systems that broadcast throughout the United States can promote the creation of a "national curriculum"
8. There is a loss of local control of teaching and interpretation of the curriculum by local education units
9. Bell scheduling conflicts, time zone differences, differences in dates for scheduling spring breaks, holidays, etc. often conflict with local school schedules

Strengths of audiographic teleteaching (microcomputer networking)

1. Low cost is terms of hardware, software, and maintenance
2. Relatively simple to learn and to operate
3. Perpetuates rural school traditions of (a) small class size, and (b) local control of the teacher and the curriculum
4. Permits not only teacher-student interaction but also allows for student-to-student audio interaction as well as computer graphic interaction
5. Any participating site can serve in either a "receive" or a "transmit" mode
6. Instructional content is more on content and organization of material rather than on personality of the teacher
7. Students at all sites and the teacher share the same visual reference on the computer screen
8. Operates over regular dial-up telephone lines

Weaknesses of audiographic teleteaching (microcomputer networking)

1. Motion is not possible
2. The instructor cannot see the students, no can students see the instructor or other students at distance sites
3. Extraneous noise or interference can cause voice transmission on the speaker telephones to occasionally "break up"
4. Transmission costs for telephone toll charges can become excessive
5. The video graphics/image displayed between computer monitors is limited to the size of the computer screen unless additional hardware costs are incurred
6. Lesson planning (creation of computer visuals) can be considerably time consuming for the teacher, and floppy disks must be distributed to all remote sites prior to instruction

Advantages of Two-way TV instruction (fiber optics, microwave, cable, etc.)

1. Two-way, full-motion video is possible between all sites; students can see the teacher as well as other students at different sites, and the teacher can see all students at all sites
2. Most systems presently in operation are small networks that promote local control of the teacher and curriculum and maintain an overall small class size
3. Open-line microphones allow for full teacher-student and student-to-student audio interaction
4. Most TV signals are usually unaffected by weather

Disadvantages of Two-way TV instruction (fiber optics, microwave, cable, etc)

1. Cable (to be used as an extra broadcast channel) in many rural areas is still not available
2. Fiber optics, although becoming more available, is still not accessible in many rural communities; also it is very expensive to lay if it has not already been installed
3. Virtually all successful two-way TV systems are based around a partnership arrangement between the local school and business or industry officials in the area; some rural communities may not have the "required" pool of human resources available
4. Most systems require a large amount of capital investment to get started

Again, my list of advantages and disadvantages is certainly not exhaustive. From my perspective, the advantages far out weigh the disadvantages. Also, some of my stated disadvantages may in the future be eliminated as other professionals in the field find solutions around some of the problems to which I have made reference.

To those of you who are investigating a particular technology or vendor to use for delivery of distance education programs, I wish to raise several issues and concerns that

you might consider before making your final selection.

Materials transfer: each distance education project must establish an efficient and reliable system to exchange materials between participating schools. Tests, quizzes, assignments, textbooks, and other materials may be transported by postal service, teacher who live in one district but teach in another, fax machines, etc.

Classroom management: a single policy for dealing with students in distance education courses should be established and enforced. A consistent procedure for dealing with student discipline problems is vital to the success of a distance education program.

Remote site visits by teachers: students at remote classrooms should have the opportunity to periodically meet their teacher "in the flesh" and become personally acquainted.

Levels of interaction: are students able to interact only with their distance education teacher or can they also interact freely during the class with other students at remote sites. Technologies that permit interaction only between teacher/student are much more limiting than those that permit both teacher/student and student/student interaction.

Extent of course offerings: programs that offer a variety of courses or a broad curriculum are generally more favorably received than those than offer only a few courses.

Selection of teachers for distance education delivery: distance education teachers of necessity must be "master" teachers. This implies not only that they understand and model principles from the literature on "effective teaching," but that they also know how to best use the respective telecommunications medium to convey their teaching. For example, we can learn much from the field of mass communications (eg. commercial radio and television) in regards to how to present information via the airwaves. Furthermore, teaching pedagogy -- as related to distance education -- requires forced

interaction between teacher and students, a slower pace of instruction, clear logical presentations with sufficient structure, etc.

Technical breakdown: there will be down-time with any system. Anyone who drives a car knows that technology doesn't always work. Who's going to fix things when they break down. Maintenance agreements with vendors and contractors are important factors for policy makers to consider when forming a cooperative or entering into an agreement with a large distance education vendor.

Teacher training: some training of teachers is essential. Regardless of how exotic or exciting the technology may be, it will never be a substitute for poor instruction. Ultimately, the significance of the content present and the quality of the presentation delivery will be much more important than the technology used to convey the message.

The "personal touch": there must be a personal touch between both the students and the teacher. The students at the remote sites must feel a sense of belonging to the host site classroom. The teacher should call the students by name, look directly into the camera (if the instruction involves TV delivery), etc.

Scheduling: One of the biggest problems with large distance education programs is the matter of bell scheduling. This becomes compounded when programs are broadcast over different time zones. The matter is not easily resolved because a school district's bell schedule is dependent upon bus routes, lunch schedules, elementary and middle school schedules, etc. A related problem is the scheduling of local school start and ending dates, parent teacher conferences, state mandated teacher inservice or preparation days that close classes, variation in Spring breaks and Christmas vacations, etc. Another factor is the issuance of grades. Some schools operated on a 9 week grading period while others are on 6, 12, and 18 week student evaluate periods.

Local control: most rural school districts fiercely protect local control of their

curricula and scheduling. Most often, they do not want outside "experts" dictating what classes will be taught and when. Local educators should have a choice of options when selecting a distance education alternative. For example, if a school selects one of the present satellite vendors, a steerable dish with a Ku and C band feedhorn should be the standard downlink dish. This would allow the school an opportunity to take classes from a selection of vendors and not be "locked in" to just one provider.

Class size: overall class size will have a direct impact on opportunities for student interaction. Small, locally controlled cooperatives usually limit class size and thereby maintain a "personal touch" between the teacher and students. Systems that have a national focus (eg. satellite vendors) may have 200+ students enrolled with very limited opportunities for interaction.

To further help guide you in your selection, I suggest you give thought to the following instructional considerations:

Distance learning instructional considerations

1. How does the student ask questions during class?
2. How does the teacher judge if meaningful learning is occurring?
3. How is student independent work monitored?
4. How are homework assignments, tests, etc. administered?
5. How large is the total class size?
6. What are the opportunities for teacher/student interaction?
7. What are the opportunities for student/student interaction?
8. How does the distance education teacher handle office hours?

My speech before you this afternoon has been entitled, "Distance Education Technologies: All that glitters is not gold." My attempt has been, in part, to lay before you some of the advantages and disadvantages of various distance education technologies. And, while it is true, all that glitters is not gold, I must also clearly state that much of what I see in distance education delivery is of high quality and is meeting students needs that have previously been unmet. In other words, "there is gold in them thar' hills!"

Please allow me to close with the following points which I believe will help one distinguish between that which is real and that which is fools gold:

Successful distance education practices

1. The program/system must be carefully planned, well organized and efficiently managed.
2. A multi-media approach is typically more effective than a single type delivery system (eg. fax, computers, and TV).
3. Distance education is not curriculum specific.
4. Successful programs are based on current educational theory and practice. Correct principles of instructional design are vital for program success. Teacher presentation techniques should be in harmony with the current literature on effective teaching.
5. The master teacher is the crucial element of success. Must be a subject matter specialist, highly motivated, enthusiastic, charismatic, and able to project well over the selected medium.
6. The classroom facilitator at the remote site must like young people and be a strong supporter of distant education.
7. Educational support systems must allow for the smooth and efficient handling of written materials, homework, tests, etc.
8. Finally, the success of any telecommunicated distance education delivery system will ultimately depend more on the quality and usefulness of the content received than upon the equipment used.

I wish each of you the very best as you investigate then decide upon the type(s) of programs/technologies to implement to meet local needs in North Dakota.