

Appendix I

INTERACTIVE HIGHER EDUCATION NETWORKS IN TEXAS

The Texas Higher Education Coordinating Board, in its response to SCR 66, included this list of 16 higher education telecommunications networks devoted to the delivery of instruction. Also included is a list of additional education networks (labeled "Other Higher Education Networks in Texas") that are designed for, or available to, Texas K-12 Schools.

Links East Texas State University to their education center in Mesquite, Texas and focuses on teacher education.

ETSUNET

DECANET is an interactive microwave delivery system that provides two-way video and two-way audio with multiple transmit/receive sites within its service area. Frank Phillips College has utilized the network to service the 10,300 square miles of the upper ten counties of the Panhandle since 1986. The University of Texas at Arlington started using the network in 1990 to send nursing courses to ETSU Texarkana, Grayson County College, McLennan Community College, and Paris Junior College.

DECANET

Links the Dallas Community College District campuses.

DC NET

InterAct Instructional TV Network in Houston area is operated by Region IV Education Service Center. It is an ITFS system that spans a seven-county area in Southeast Texas in which colleges in the Gulf Coast Consortium can participate in telecommunications technology. InterAct was first used in 1988. University of Houston and about seven community colleges can use this network. Receive sites are mostly area independent school districts.

INTERACT
NETWORK



INTELNET	El Paso Community College District can use InTelNet, which is an Instructional Television Fixed Service (ITFS) system utilizing one-way video and two-way audio. InTelNet services the El Paso area and has been in use since 1989. Receive sites include factories, housing projects, satellite centers, senior citizen centers, schools and other areas where citizens can gather.
LUBNET	Links Lamar University-Beaumont with area sites and focuses on teacher education.
SCHOOLINC	Links University of North Texas to two area high schools and focuses on teacher education.
SFA NET	Links Stephen F. Austin University to Angelina College and focuses on teacher education.
TTVN	(TAMU System) Links the Texas A&M University System schools. Receive sites include: College Station, Austin, Temple, Galveston, Laredo, Corpus Christi, Kingsville, Prairie View, Stephenville, Canyon, Houston, Dallas, and San Antonio.
TECHLINK	Links Texas Tech University with Regional Academic Health Centers in Amarillo, El Paso, and Odessa.
TAGER NETWORK	The TAGER Network is a service of the Alliance for Higher Education, a consortium linking the academic and corporate communities of the North Texas region. The TAGER Network, a pioneer in distance education, began operation in 1967 to provide convenient, graduate level engineering and computer science instruction directly to the workplace for professional employees at several Metroplex high technology companies. Over the years, the network has added undergraduate programming as well as non-

credit offerings. From the beginning, TAGER has assisted area employers in attracting and holding well-qualified engineering and management talent while expanding the educational reach of area academic institutions. Participating institutions include UT Arlington, UT Dallas, University of North Texas, UT Southwestern Medical Center, and Dallas County Community College District. A sample of receive sites include Alcatel BNR/Northern Telecom, Boeing, E-Systems, Lockheed Fort Worth, Motorola, Rockwell International and Texas Instruments.

Links Texas Woman's University to ETSU sites in Commerce and Mesquite, and to West Texas A&M University. Course offerings focus on speech pathology and library science.

The TI-IN Network, used by Texas A&M University-Kingsville, started as a cooperative venture between the network and the Texas Education Agency to help cope with teacher shortages and provide students with new class options to allow school districts of all sizes to take advantage of high quality instructors and programs.

Links University of Houston to various receive sites in Houston area.

Links Southwest Texas State University to San Marcos and Bowie High Schools.

Links the UT System schools. Receive sites include: Arlington, Austin, Brownsville, Dallas, El Paso, Edinburg, Odessa, San Antonio, Tyler, Galveston, Houston. M.D. Anderson is also an approved receive site.

TWU NET

TI-IN NETWORK

UHSYSTEM

UNITYNET

UT SYSTEM



UT-TV Links University of Houston to various receive sites in Houston area.

EMSTAR The EMSTAR Satellite Network is a national training and educational satellite network designed for and by Emergency Medical Service (EMS) personnel. HealthNet of the Texas Tech University Health Sciences and its EMS Program offers accredited EMS continuing education. EMS personnel throughout the continental U.S., Canada, Mexico, Alaska and Hawaii can view at least 104 hours of programming via satellite dishes at their workplace to earn required continuing education hours.

MEDNET Links Texas Tech School of Medicine campuses in Lubbock, and the Regional Academic Centers in Odessa, Amarillo and El Paso with hospitals in rural communities such as Alpine, Andrews, Big Lake, Canadian, and Colorado City. The services, which vary with the individual hospital's needs, include satellite transmission of continuing education programs, video consultations, telepathology and teleradiology.

RURAL HEALTH SATELLITE NETWORK RURAL HEALTH SATELLITE NETWORK is a satellite-based education network (live one-way video and interactive audio) used by Texas Tech Health Sciences Center to serve health care professionals working in rural communities. Continuing education program and health care degree programs are delivered to physicians, nurses and allied health professionals at over 80 rural hospitals and clinics. The signal (foot print) of the satellite system covers the State of Texas, the continental U.S. and most of Canada and Mexico. Any location in this "foot print" can receive the signal. Audio bridging facilities permit the interaction of participants with the live instructor and with one another.

A satellite-based teleconference training network that links community colleges throughout the state with the primary mission of helping technical-vocational faculty keep their knowledge and skills current. No credit coursework is being offered at this time. Discussions are taking place on the possibility of universities offering master's and doctoral credit utilizing STARLINK.

STARLINK

T-STAR is a Texas Education Agency project which is designed to expand the public school system's telecommunications capabilities. Its goal is to place satellite receiving equipment systems in all school district's regional service centers. The project would assist in delivering live video programming from TEA and other sources via satellite. When this project is completed (about 1995), there will be about 1000 additional receive sites, providing access for most communities in Texas.

T-STAR

The Texas Education Network (TENET), administered by the University of Texas at Austin, is an information services network intended to support the Texas public education community with dial data services. The network has been extremely successful with nearly 35,000 teacher subscribers, and new subscriptions are received every day.

TENET

The Texas Higher Education Network (THENET), administered by the University of Texas at Austin, connects over 60 institutions of higher education and research in Texas and Mexico. THENet is used by students, faculty, and staff of the component institutions in many different ways. Computer, library, and database resources are shared between institutions. The network is also used for videoconferencing within the U.T. System and across systems. Components have direct access to the State Comptroller's Office, the Texas Legislative Council, the Department of Information Resources, and the Coordinating

THENET



Board. THEnet, along with Texas A&M University System, provide connections to the national Internet Network

**TEXAS
DEPARTMENT
OF CRIMINAL
JUSTICE-TEXAS
TECH
UNIVERSITY
HEALTH
SCIENCE
CENTER**

TEXAS DEPARTMENT OF CRIMINAL JUSTICE-TEXAS TECH UNIVERSITY HEALTH SCIENCE CENTER is a collaborative network being installed which will provide education, administration, communications, and telemedicine services to 22 Texas Department of Criminal Justice (TDCJ) prison facilities in 17 West Texas communities. Services on this network are delivered via a two-way interactive video satellite link which connects TDCJ and Texas Tech University Health Sciences facilities.

**WEST TEXAS
EDUCATION
NETWORK**

WEST TEXAS EDUCATION NETWORK is a consortium system operated by the Panhandle-South Plains Center for Professional Development and Technology. The network currently has 8 two-way interactive video sites located at Texas Tech University College of Education, Lubbock Christian University, Wayland Baptist University, West Texas A&M University, Education Service Centers 16 and 17 and the Dumas and Lubbock School Districts. This system is used primarily for delivery of professional education for teachers, but also includes a wide area data network linking students and teachers for instructional activities. The system can be linked to other area networks and is exploring linking with UT El Paso and with the Education Service Center 18 in El Paso.

Appendix II

POINTS OF CONTACT FOR FURTHER INFORMATION

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Appendix III

TELECOMMUNICATION SYSTEMS USED FOR DISTANCE EDUCATION

- This system is readily available because telephone lines are abundant and are familiar to most everyone.
- Setting up a conference requires very little time and is not expensive.
- An instructor doesn't need to know a lot of information on setting up and conducting a conference.
- Course participants can adapt quickly to this technology.

**Telephone
Audioconferencing**

- This system is similar to telephone audioconferencing but is visually enhanced with graphic and still images handled by computer technologies.
- The equipment used requires knowledge of operation and capabilities.
- Visual information is transmitted during class sessions and provides additional real-time interaction among participants.

**Audiographic
Conferencing**

- This system uses personal or networked computers and communication software. It allows for the exchange of text messages between course participants.
- Interaction can take place at almost any time of day or night thus providing a flexible schedule for all participants.
- Information exchanged through computer systems is easily stored and handled. This helps reduce paper work and increase record keeping efficiency.

**Computer Based
Messaging**



**Satellite
Broadcast**

- This delivery system generally provides one way communication and interaction via television. Return audio is sent via telephone lines. Information is uplinked from a central location to an orbiting satellite and then downlinked to the remote site dishes.
- Programming is usually scheduled first. Course planning is done around the program schedule.
- Audiovisual presentation is planned and implemented to suit the specific viewing audience.
- Activities and follow-up discussions can be used to reinforce course content.

**Interactive
Television (ITV)**

- This system provides two-way video and audio transmission. The dissemination of instructional information is enhanced and instructional activities involve all course participants via video and audio.
- Types of systems that can deliver two-way video and audio signals are: low power television, cable, microwave, fiber optic telephone lines, Interactive Television Fixed Service (ITFS), FM microwave, and compressed video and slow scan via telephone lines.
- Course scheduling is done primarily through the local institution.
- This medium can provide for highly interactive instructional delivery.

Appendix IV

AN INSTRUCTIONAL DESIGN MODEL: A DETAILED DESCRIPTION

This phase of the ID process will provide information relevant to the learning environment, the learners and their instructional needs, and the learning task(s). The analysis of the learning environment will provide information concerning the delivery system and its capabilities, and the resources available that are available for use through the system. The analysis of the learners and their instructional needs will provide information that will help in the writing of lesson objectives and in the design of learning materials. Moller (1991) suggests that a learner analysis should identify:

- motivation
- optimal learning style
- reading comprehension
- existing prior knowledge of the topic
- course expectation
- familiarity with distance learning
- experience and ability with the hardware, software, and technology
- time commitment and availability
- education level and experience (p. 55)

The analysis of learning tasks will provide learning objective information and test items. The writing of lesson objectives and test items will be simplified if this analysis is thorough and concise. Applying the second step (state objectives) of the ASSURE model, leads to addressing these factors associated with distance education technology:

- Can course objectives be met through distance education media?

Analysis

- Do the objectives require interaction, brainstorming, feedback, or special equipment beyond what is accessible in remote locations?
- Does participation and end-of-course performance require in- person observation/evaluation?
- Can secondary objectives such as socialization, networking, small group breakout sessions be met in remote location?
- Are local facilitators (when necessary) trained and available? (ibid., p. 56)

Consideration of these questions will help determine if the delivery system is capable of providing for effective delivery of the course to be taught. Other delivery mediums should be pursued or new objectives should be written if these factors cannot be met using the distance education technologies initially selected.

Strategy

This stage of the ID process will determine media and material selections, how the material will be presented to the distant learners, and the sequencing of lessons. Factors to be considered that affect media and materials applied to distance education technologies include:

- What are the limitations or advantages of a given medium and how do these impact the program?
- Will the media or materials work in a distance education environment?
- Are there sufficient technical resources available for production, delivery, and utilization?
- Do the presenter(s) and development team have experience with designing, producing, and delivering distance education? (ibid.,p. 56)

Additionally, other questions needing to be answered during this stage might include:

- What kinds of content must be learned by the students? In what size segments should content be presented? Should information be presented, or should the content be embedded within an activity?
- What activities should the learners engage in? What role will learners' activities have? Will they supplement essentially informational presentation, or will they be primary means of learning? Are discussions needed?
- In what sequence should instruction proceed?
- What media are most appropriate for the delivery of instruction? Should learners see a live demonstration, a videotaped presentation, etc.? Or should they read about it in a text or workbook?
- What grouping will learners be placed in for learning? should they study independently, in a small group, or in a large group? (Smith & Ragan, 1993)

In developing a delivery strategy, Gagne's (1985) nine events of instruction provides a suitable framework to follow. The nine events include:

- (1) Gaining the learner's attention. This event will attempt to gain the attention of the learner. Attention gaining tactics such as a unusual event or observation, a verbal statement, visuals, and/or introduction information constitute what is utilized to accomplish this event. It is important to gain the learner's attention in a meaningful manner so that the learner will prepare him or herself for what is about to be delivered through instructional setting.
- (2) Informing learners of the objectives. It is important to inform the learner about the learning that is about to take place so that the learner can understand and respond to the material to be presented. Interaction

can really begin to take place upon informing the learner of the lesson objective(s). Objectives often indicate what the learner will be able to do after the lesson, under what conditions this will be done, and what degree of difficulty will be required.

- (3) Stimulating recall of prior learning. To better prepare the learner, stimulating the recall of prior knowledge and prerequisites will benefit the learner during and after the completion of the lesson. Prerequisite knowledge can involve such things as verbal information, cognitive strategies, intellectual skills, or motor skill. By allowing the learner to be prepared with this recall of knowledge, lesson content and outcomes will be provided more efficiently and effectively.
- (4) Presenting the stimulus. This is the step that introduces the new material to the learner. There are various methods of presenting the new material. Teaching models or methods can provide the delivery means for administering instructional content. Whatever method or approach is used, it is important that the material should be presented in a meaningful manner that will pique the interest of the learner.
- (5) Providing "learning guidance". Example problems or scenarios are given to the learner to work through, assimilate and/or reflect upon during this event of instruction. The learner will gain the abilities and the experience necessary to fulfill the lesson objectives from this segment of the lesson material. Practice of planned content activities will help the learner grasp verbal information, concepts, rules, and problem solving skills that will be required at the completion of the lesson.

- (6) Eliciting performance. Upon completion of the practice segment, the learner will be given questions, problems, and the like, and will be asked to work through them. This event of instruction is provided to prepare the learner for the actual kinds of problems that he or she will encounter in the formal assessing of learner performance. If the learner is to have any problems working these he or she will find out during this segment of the instructional sequence.
- (7) Providing feedback. If there is a need for the learner to receive corrective feedback it will be determined from the eliciting performance step of instruction. This is an important step of the instruction process because it helps the learner to understand where problems exist and how to overcome these problems prior to the performance assessment. Feedback can be provided in a number of ways that help the learner actually acquire a better understanding of the material being presented. Some feedback methods induce thought processing, recall of verbal information, and so on.
- (8) Assessing performance. This step of the instruction sequence formally tests the learner to determine if the desired learning outcomes have been achieved. Testing can be administered through written questions and problems, demonstration, experiments and so on, to determine if the desired learning has occurred. There is usually no feedback given during this step of the instructional process, but upon completion of the assessment process, it is usually administered.
- (9) Enhancing retention and transfer. The final step in the instruction process is helping the learner retain the information that was presented in the lesson. This can be done through summaries, application

examples and other applicable means. It provides the learner with additional information that will be beneficial in remembering or recalling this information, skill, strategy, etc. Remediation is provided when the learner needs more time or needs clarification of lesson material in order to achieve the lesson objectives. The learner can be sent back through the lesson material for additional stimulation and practice.

Lessons can be written at this point and will be produced from the information gathered from the learning task analysis, test items, and the strategies determined earlier during this stage. Material usage, time constraints, class preparation, and the presentation of materials follow. Additionally, distance learning classroom needs include: facilities containing compatible equipment, on-site or available technical help, local administrators and/or trained facilitators, communications capabilities between host and remote sites, and comprehensive directions for using materials at a remote site, and procedures for handling technology problems. (Moller, 1991, p. 56)

Evaluation

The final stage determines if the course materials, delivery, and other aspects associated with the course are effective. The determination of revisions needed takes place here. Evaluation instruments can be developed to provide formative and summative evaluations. Areas of particular concern include learner achievement, media and methods, and instructional process. Revision can be made and implemented. Future revisions can then be determined through future deliveries to provide the most effective delivery of instruction that is obtainable.

Appendix V

SEVEN CHARACTERISTICS FOR CREATING AN EFFECTIVE DISTANCE LEARNING MODEL

(Allen & Carl, 1988)

Responsibilities must be shared and coordinated to assure that high quality instruction is possible. The need for several types of professionals with particular responsibilities is seen as essential. The instructor/content specialist is responsible for developing course content to standard levels, delivery of this content, designing tests/assignments/activities, and handling student work.

The project manager's responsibilities include overall management of the project, particularly elements that were not associated with direct instruction of the students (i.e., site managers' workshops, evaluation reports, logistical concerns, and coordination of resources). The instructional designer works with the instructor to help transform the instruction into a form that can be effectively delivered via the DE delivery system. Other duties include: formatting lesson plans, obtaining copyright permissions, and coordinating the distribution of print and mediated instructional materials.

The site managers are selected and assigned to participate in the distance learning project as a portion of their duties. Example responsibilities include: arranging for students to learn to use various educational technologies and distribution of course materials. Shared characteristics of site managers included an interest in distance learning, an ability to organize academic activities, and a capability to deal with ambiguity.

Support personnel include three types: 1) technical personnel who monitor conference connections and quality of transmitted signals; 2) a computer specialist used to assist in

Standards for
Teachers and
Mediators

matters concerning computer hardware and software purchase and use; and 3) a graphic artist who produces quality printed materials (i.e., lesson plans and class handouts) using a laser printer. These materials are then mailed to site managers and students.

**Consistently
Train and Retrain
Staff**

Whenever technology is used as a means to deliver instruction, it is necessary to train staff and students to use the media effectively. Site managers are trained to provide day-to-day maintenance of the computers and transmitting equipment, perform trouble shooting, prepare the classroom so that it is conducive for student learning, and use computer communication software.

Follow-up training can also be provided. On a regular basis the project manager contacts the site managers on an individual basis to provide assistance in using hardware and software and to answer any question or solve any problems. Also, additional instruction can be provided on advanced techniques for using the educational media.

**Evaluate
Instructional
Materials Before
Distribution**

Instructional materials are evaluated on accuracy and quality. Content accuracy of print and mediated instructional materials are reviewed by at least two content specialists and editors to assure content accuracy and grammatical/spelling correctness. All printed materials are to be produced on laser printers giving them a professional appearance. Mediated materials are borrowed, purchased, or rented from commercial firms.

**Ensure
Provisions for
Communications**

Both development and delivery of instruction might be done at a distance. The instructor might prepare the curriculum and lesson plans from one location while the instructional designer and other support staff work in another location. Therefore, communication must take place by whatever means are available (i.e., telephone, travel, electronic mail, and regular mail).

Other communication opportunities include: monthly site manager and project staff meetings; weekly written reports from site managers; telephone conversations; and of course, the sharing of electronic mail among the instructor, site managers, project staff, and students. A hotline number can be provided to all site managers and the instructor so that critical problems or suggestions can be acted upon quickly and efficiently.

Interactive mediums require time for students to ask questions and receive answers to questions. Conversations tended to be of a general nature and of interest to most students in the class. Electronic mail was used for personal messages. Unit examinations can be administered by site managers and mailed to the instructor. To expedite reporting grades, the instructor used electronic mail to send test scores to site managers and students. Some assignments can be done on word processors and sent by electronic mail to the instructor for evaluation. This communication can help keep lag times to a minimum.

Each week the students received copies of the week's lesson plan, class handouts, and assignments. Evaluation forms completed by the site managers indicated that these materials arrived in a timely fashion and assisted the students in learning and planning their study time.

All students have access to support materials such as: library holdings of reference materials, videotape programs and video players, computers and printers for electronic mail and word processing, computer-assisted instruction, and the like. Site managers are also able to handle some student problems.

**Provide for
Rapid Response
Time and
Feedback**

**Package Course
Content**

**Provide Ready
Access to
Resources**



Glossary

adult learner. An individual, usually highly motivated, involved with the furthering of his/her education while still working, raising a family, etc.

assessment. The process of determining the quality or effectiveness of an instructional lesson, unit, course, program, etc., by implementing questionnaires, pretests, and posttests.

Canfield Learning Style Inventory. An instrument used to measure the conditions of learning, the content of learning and student expectations in a learning situation.

computer-based messaging. The process of communicating with others by exchanging text messages through computers using communications software and computer modems or networks.

computer-mediated communication. The using of computers to provide a flexible communication link between participating instructors and students.

conditions of learning. The conditions that are present in and associated with the learning environment, the delivery of course content and its structure, and the relation of these with the learners' characteristics and their learning styles.

course design. The process of producing course lessons, materials, and a planned presentation structure when considering the delivery system, available resources, course content, the learners and their learning styles, and their ability to participate in the learning process.

delivery medium. The path through which information and instruction are transferred to the distant learner (i.e., face-to-face, telephone, television, etc.).

- **distance education.** Delivering instruction through means other than by the traditional classroom method (i.e., correspondence, pre-recorded video lectures, interactive and satellite television, etc.).
- **distance learning.** Characterized by the use of telecommunication technology to link teacher and learner who are physically apart from one another.
- **electronic mail.** Textual information that is transmitted to and from individuals who are communicating via a computer and modem or by a computer network.
- **extended syllabus.** A syllabus that includes a course description, course goals, readings and assignments, a topic outline, grading policies, handouts, copies of overhead transparencies, study questions, reprinted articles, and other textual and graphical information.
- **feedback.** Information provided to the instructor by verbal or written means that indicates if presentations and course content were clear and effective. This information can be obtained by questionnaires, interviews, group reports, and open discussions.
- **Field Independent learner.** Learners who prefer solitary situations and self-defined goals, strategies and reinforcement.
- **Field Dependent learner.** Learners who prefer group situations, externally defined goals and reinforcement, and explicit instructions or definitions.
- **formative evaluation.** An ongoing evaluation process, originated from the development of course materials and content delivery, that determines if there are problems with these and what possible revisions might need to be implemented.
- **humanizing.** The attribute of an environment created to generate feelings of rapport between the teacher and students.

instructional design process. A process used to help insure that designed instruction is produced and delivered effectively, thus promoting student learning.

instructional television. The use of videotape or live television programs to provide specific instructional content to learners so that related instructional goals can be achieved.

interactive study guide. A highly organized set of student notes, graphics pictures, graphs, charts and activities which are used in conjunction with a telelecture that allow the learner to concentrate on the cognitive, analytical and critical thinking skills being demonstrated by the instructor. (Cyrs and Smith, 1991, p. 37)

interactive television (two-way). A technological setup that includes two or more classrooms equipped with cameras and televisions that provides students and instructors with the ability to see and hear one another.

learner characteristics. Those characteristics associated with the learner's ability to engage in the learning process (i.e., cognitive abilities, motivation, prior knowledge, learning styles, etc.)

learning styles. The individual's method of perceiving, processing, organizing, and assessing delivered content information.

message style. The technique used to enhance the interest and appeal of a presentation by planning for short instructional segments, varying tone of voice and volume, and supplementing programs with visual aids, and in turn, maintaining the interest and attention of the students.

originating site. The site, relating to the interactive television setting, from which the instructor is delivering the course content or lesson.

• **participation.** The extent of interaction among participants in the interactive television instructional situation.

• **receiving site.** The site(s) that receive the course content or lesson and that are at a distance from the originating site.

• **satellite broadcast.** This delivery system generally provides one way communication and interaction via television. Return audio is sent via telephone lines. Information is transmitted from the originating site to an orbiting satellite that transmits the signal to the receiving site satellite dish.

• **summative evaluation.** The evaluation process occurring at the conclusion of the course. It will provide data on the effectiveness of the course and may include data collected during formative evaluations. Data gathered through the summative evaluation process will help in planning future courses.

• **teaching method.** A technique used to deliver content that incorporates specific actions and processes that are intended to induce a particular reaction and type of learning in the students.

• **technical media.** Media, such as print, audio, video, or the computer, that unite the teacher and learner and help carry out the content of the course.

• **telecommunication technology.** Technology such as telephone lines, microwave systems, and satellites that is used to transmit instructional information.

• **telelecture.** The instructional presentation by an individual (a content specialist or other authority) who addresses a group through a telecommunication system such as a telephone amplifier and a video camera.