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ABSTRACT

Many administrators are meeting specific instructional needs of their students without always or solely relying on classroom teachers by utilizing distance education, i.e., instruction that takes place while the learner is physically distant from the instructor and/or the materials. Distance education is particularly appropriate in rural and small schools where low enrollment limits course availability, but it is also useful as state legislatures raise graduation requirements for students and accreditation requirements for schools while budgets are declining. This guide provides descriptions of distance education programs that are in operation, such as teleconferencing (PRISMS, "Operation TECPAK," Gemini Electronic Blackboard, TELENET), interactive videotape (Winthrop Rockefeller Model Secondary Project), microcomputers ("The Computer Chronicles"), teletype, and others. Studies are cited that show distance education is effective. Hints for doing distance education right are listed along with the admonition that distance learning programs need good planning, management, structure, and master teachers. Distance education costs are discussed and representative examples are given. Some distance education issues are reviewed (teacher certification, course accreditation, textbook adoption, Average Daily Attendance/funding, class size). The guide concludes with a resource list of 18 experts, state department of education contacts for six states, and a 16-item bibliography. (BRR)

THE SCHOOL PROBLEM-SOLVER'S GUIDE TO DISTANCE EDUCATION

by

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November, 1984

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Introduction

Like the old joke about the gypsy recipe for chicken that begins, "first steal a chicken," the school administrator, when faced with the need to provide a course, naturally thinks, "I have to hire a teacher." And, then realizes, "But, I don't have the money to hire a teacher. And, there aren't qualified applicants anyway. I don't have time to train my current staff. And, they're stretched too thin already." When the course is needed by a group of students or required by state regulation, the dilemma is acute. The dilemma can be resolved, however, by rethinking the premise. As the then-Commissioner for Finance and Program Administration and current Interim Commissioner of Education at the Texas Education Agency recently said, "to offer a course, you don't have to hire a teacher."

Administrators in the six states that comprise the Southwest Educational Development Laboratory (SEDL) region and beyond are meeting the specific instructional needs of their students and their state and federal regulatory requirements without always or solely relying on a classroom teacher. For example,

* a rural high school in Arkansas provides advanced mathematics to a class whose small size does not warrant hiring a teacher
* elementary schools in California ensure that all of the students drill in mental arithmetic and spelling -- at home
* high schools in rural Kansas provide college-credit courses in science and literature to its honors students
* high schools in a low-income area of Texas can afford to convey basic skills as well as advanced mathematics to small groups of students

* administrators in rural Iowa assure that their science teachers receive frequent inservice in modern physics -- both information and teaching techniques.

How do the administrators of these schools attain these accomplishments? They all rely on "distance education."

"Distance education" or "distance learning" is "instruction that takes place while the learner is physically distant from the instructor and/or the materials." In the examples given above, the Arkansas students learn from interactive videotape*; the California students are drilled by a computer that telephones them regularly at home; the Kansas students convene in three dozen locations around the state for lectures-by-telephone; the Texas students read, write and speak their questions and answers via an electronic blackboard; and, the physics teachers learn by telephone conference. The methods, which are described below, and the instructional levels vary as do the uses of distance education in the school's program. In some cases, an entire course is taught over a distance while in others, students in a classroom receive enrichment from a distance. In all cases, however, administrators are arranging for instruction needed by their students and teachers which they otherwise would not receive. And, they are doing so in cost-effective and instructionally effective ways.

In order to help you consider the extent to which distance education can help your district, this Guide addresses:

* current practices that your colleagues are engaged in

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* Please see "Resource Information: The Experts" for names and addresses of people who can respond to your questions."

* results revealed by both experience and research

* methods -- equipment possibilities and suggestions for success

* costs -- guidelines for planning and representative examples

* policy issues raised when implementing these techniques

* lessons that you can derive from this Guide and put to use.

First,

Who is Teaching by Distance and Why?

I am Required to Provide a Course, but
. I can't afford a teacher
. I can't find a teacher

This problem is occurring with increasing frequency as state legislatures raise graduation requirements for students and accreditation requirements for schools. Many schools, for instance, are faced with the necessity to add computer literacy to their curriculum or equal access for all students in federally supported programs while their budgets are declining.

A variant of this problem occurs at the level of teacher education and is being solved by two programs in Iowa. Widely dispersed schools needed to provide inservice training to science teachers who have a limited background in physics. They are able to do so by linking the teachers through periodic teleconferencing during which instructors from the University of Northern Iowa and the state education agency both teach physics to the teachers and model appropriate in-class pedagogy. The program, **PRISMS,** also uses laboratory materials and videotapes sent to the schools before each teleconference.

Another program administered cooperatively between the University and the state education agency provides coursework required for certification of vocational education teachers throughout the state. **"Operation TECPAK"** (Teacher's Competency Packet) uses teleconferences and mailed audiocassettes, as well as site visits to teach trade and vocational information.

I Want to Meet Individual Needs, but I Can't Hire a Teacher for Individuals

Dallas, Texas' South Oak Cliff High School offers trigonometry and calculus even though a maximum of only seven students at each of the three school sites wants to take the courses. The courses are taught by one teacher to the three sites by means of a **Gemini Electronic Blackboard** and Quorum teleconferencing equipment which send speech and writing over telephone lines. From one location, the teacher can talk to and write questions or diagrams to the other locations which can respond orally or in writing to one another. A paraprofessional at the other two sites maintains discipline and distributes materials. (The Blackboard is also used for seminars, staff development, foreign language and basic skills, planning among the principals who would not need to travel to a common site, and as a "substitute teacher" when an absent teacher cannot be replaced.)

Similarly, the **Winthrop Rockefeller Model Secondary Project**, administered by the University of Arkansas, allows small groups of students in rural schools to study trigonometry, physics and chemistry by receiving instruction on an interactive videotape. As with the students in Texas, these youngsters would miss the coursework were t not for the distance teaching since certified teachers are not available in their area.

Through the **TELENET** system, a permanent teleconference installation coordinated by Kansas State University (KSU), gifted students in rural Kansas gather in one of the thirty-six sites or in one of the up-to twelve temporarily connected schools for eleven lecture and discussion sessions. For the course titled "Eminent Authors" the students talked with the authors themselves. The students submit a referenced paper that is

evaluated by a KSU professor; students whose work is acceptable receive two college credits at KSU.

I Need to Improve Basic Skills

Schools in California, Alaska and Australia are improving reading, writing and editing skills in an exciting way that is cost efficient and that promotes student self-reliance. Using a microcomputer and **"The Computer Chronicles"** software, which guides the students' writing in English or Spanish, students in these locations write news stories and send them by mail or electronically to the other sites. When a school receives news, the students edit the material and publish a newspaper about these disparate sites around the world.

If the computer is the wave of the present, an elementary school in Caldwell Parish, Louisiana has found that an old-fashioned distance learning machine can greatly improve phonetic analysis, summarizing, speaking and map reading. The wonderful machine is the teletype from which students edit the reams of material into a daily newspaper and radio program that is delivered by the students and broadcast throughout the community.

Through **"Dial-a-Drill"** 450 California students spend ten minutes every day drilling in arithmetic and spelling when a computer with a synthesized voice calls them at home and asks them questions to which they respond by pushing the buttons on their touch-tone telephones.

How Well Does Teaching by Distance Work?

"Instructional media systems can teach content as well as traditional instruction, and sometimes media can do it better."

Phi Delta Kappa

The Experience

The administrators of the program just described are uniformly enthusiastic:

* "Operation TECPAK" yields a remarkable 90% completion rate.

* The Gemini Blackboard is "motivational beyond belief," according to the program coordinator; it engenders competition that does not diminish, encouraging students to work hard to be able to speak and use the board.

* Arkansas students studying trigonometry via interacative videotape completed the course in one-third the time of conventional classes and scored between the 62nd and 90th percentiles on a normed test.

* TELENET has discovered precocious students who have pursued college-level work in science while still in high school.

* Students involved in "The Computer Chronicles" have forsaken recess for language arts and have improved on grammar tests at least one grade level.

* Caldwell, Louisiana students' self-image has improved as they acquire a wealth of information about the world and an increased interest in world events.

Experience shows that students improve both personally and intellectually when they learn at a distance.

*The Research**

Controlled research that compares learning by distance with classroom instruction is limited; some of the technologies are new, and those that are not, such as the telephone, have only recently been put to use as instructional media. Nevertheless, the pattern is clear: distance education works.

While training child care paraprofessionals, the North Carolina Office of Child Care Workers in 1984 compared identical training conducted in four settings: (1) traditional classroom; (2) over telephone with the addition of slides; (3) over telephone with the addition of slow-scan video, which transmits still pictures over a telephone line; and, (4) over telephone with the addition of video-cassettes. The office concluded that interactive, two-way audio (that is, telephone) instruction with slides is as effective as classroom teaching and is significantly less expensive.

Other research indicates that "students who complete the [distance] course do as well as students in the traditional classroom." (Lipson, Report). Since, as Lipson noted, elementary and secondary students are a captive audience, completion rates for distance learning courses should be high and, therefore, so should the learning rate. Additional studies conducted among adult learners indicate either no significant difference or positive changes in mastery of the material and in attitude. (Smith)

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* Because this Guide is meant to be a quick and clean overview of a cost-effective, successful approach to alleviating school district problems, the research on the effectiveness of distance learning is not presented in depth. Please see "Resource Information: Reference List" for additional sources.

How is Distance Learning Done?

The Equipment

Instruction over distance is conveyed by one or a combination of the following telecommunications technologies*:

Audio Technologies.	For example,
Telephone.	
Dial Access. Students call or are called by the instructor (or computer). This can be POTS (Plain Old Telephone Service.)	Dial-a-Drill
Teleconferencing. Students and instructor interact simultaneously over a telephone or speakerphone by (1) arrangement with telephone operator; (2) "hard-wire" (permanent) lines; or (3) "meet-me" bridges, private companies that electronically adjust the signals.	PRISMS KSU
Radio.	
Broadcast.	South Carolina SEA has developed several hundred radio courses for schools
Subcarrier. Radio signals beamed to specific locations.	
Tape.	

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* There is increasing interest in satellites which are not included below because, like mail, they are a transmission mechanism rather than a delivery mechanism. Satellites offer one method of transmitting audio or video signals that are delivered on-site through television or telephone. Except for consortia arrangements, their cost (approximately $10,000 for 3 hours of use) makes them unlikely carriers for most school districts, although some districts, including Houston ISD, use satellites.

References are given for programs not discussed above.

Video Technologies.

Television.

Broadcast.	Arkansas Education Network
	Louisiana offers 123 series
	Mississippi ITV broadcasts 118 programs to 84% of the state's schools
	50 districts in New Mexico formed a consortium to buy televised instruction
	Oklahoma Agency for Instructional Television
	Texas Regional Service Centers (Report)
Cable.	Dallas and Austin ISDs offer one-way audio, two-way data transfer (Report)
	Two-way Cable Television Network, Irvine, California connects 24 schools (Hudson)
Instructional Television Fixed Service. ITFS uses special frequencies received at specified locations by a frequency converter.	InterAct in Houston provides one-way video, two-way audio to 55 school districts (Hudson)
Electronic Blackboard. Chalk marks on the pressure-sensitive board are sent over telephone lines to television sets at distant sites. Voice is transmitted in all directions over a second set of telephone lines.	South Oak Cliff, Texas
Slow-scan or Freeze-frame. Still pictures are sent at the rate of about one every 30 seconds over telephone lines.	University of Wisconsin Extension (Hudson)
Teletext/Videotext. Teletext sends pages of material to television screens. Videotext transmits text over cable or telephone channels via a distribution center which can receive user requests for particular information.	"Think Shop" in Los Angeles transmits news and quizzes to six schools (Hudson)

Teletype. AP and UPI news services are available by teletype machine. — Caldwell Parish, Louisiana

Computer.

Computer-delivered materials. Software and data can be downloaded from a central location. — Texas Educational Computing Cooperative (TECC) sends information on instructional computing (Report)

Computer conferencing. Students and their instructors interact at their convenience, storing information and questions in leased networks, such as Telenet or Tymnet.

Combinations. Combining two or more technologies increases student involvement because it requires the use of two or more names. Numerous combinations are possible, including:

Computer and videotape (interactive videotape). The videotape provides programmed learning; the computer provides interactivity by branching to various sequences on the tape depending on the student's response. — Rockfeller Model Secondary Project

Telephone and slow-scan. Oral presentation is combined with visual materials. — North Carolina Office of Child Care Workers

Hints for Doing it Right

The equipment is only the technical side of how distance education is conveyed. Researchers and administrators experienced with these systems emphasize that students learning by distance need:

1. Interaction with other students. Camaraderie can be developed among distant students, and this social factor promotes learning. (PRISMS, Report)
2. Feedback from the instructor to students' questions and assignments. Two-way communication by telephone, computer, mail or visits is key. (Lipson, Report; Smith)

3. "Emotional Support" such as inquiries from the instructor and public recognition. (Lipson, Report)

4. Beautiful materials. Well organized, aesthetically appealing materials are even more important for students studying without the presence of a teacher or at home than for students in a classroom. (Lipson, Report)

In order to be successful, distance learning programs need:

1. Careful, overall planning, involving participating administrators and teachers. (Todd, Report; Hudson)
2. Effective management; good management must proceed after good planning. (Hudson)
3. Structure. Distance learning programs have less "give" than classroom instruction.
4. Teachers who are "charismatic" and trained in both the use of the technology and the material. (Lipson, Todd, Report; Hudson)

In other words, the factors that promote success in the classroom are at least as important when teaching by distance as face-to-face; the need for a master teacher is greater.

How Much Does This Cost?

"Media will become increasingly attractive to educational administrators and fund-raisers on cost grounds."

Leslie Wagner, Economist

Factors that Need to be Computed

Bottom-line figures cannot be stated because of the variety of factors that need to be considered. When estimating the dollar, time and social costs, you should be aware of these components:

1. Capital costs of leasing or purchasing equipment.
2. Program development costs for producing or buying the curriculum and materials.
3. Training costs of teachers.
4. Program delivery of "on-line" costs of transmitting classes. These can be virtually nothing if telephone lines are used, and the distances are short, or they can be high if satellite transmission or peak-time computer conferencing is used.

In general, on-line video technology is significantly more costly than audio only, but visual presence can be inexpensively included via photographs, slides, or visuals transmitted by telephone lines. While total costs can appear frighteningly high, they are more manageable when (1) amortized over the life of the equipment; (2) averaged per student; (3) computed according to the marginal cost of adding sites or students; or, (4) divided among cooperating institutions. (Wagner, Report) For instance, while PRISMS costs over $140,000, the marginal cost is only $250 per school and about one-tenth the cost of on-site teacher inservice training.

Some Representative Examples

Cost calculation is not entirely slippery. Following the factors listed above, we can approximate the cost of teaching by teleconference.

1. Capitol costs. Installing a separate line dedicated exclusively to the course costs about $110 plus $50-$90 for installation of a jack. A speakerphone that has volume control and a microphone for picking up voices several feet away can be installed for $25 plus $12 per month rental or it can be purchased for about $1,500.

2. Program development. Teleconference courses require approximately eight hours of professional development time for each hour of presentation. (Bronstein, Report) Therefore, a ten-session course such as KSU's costs about $2500 in materials development time, not including administrative coordination which is provided by the University. There will be additional costs for reproduction of visual materials, printing, postage, etc. (Kruh, Report)

3. Training. While we are all familiar with the telephone, communicating effectively with disparate groups can and should be taught. Several hours of training by an experienced teacher-by-teleconference and practice is strongly recommended. This can appropriately be done by telephone.

4. Program delivery. In addition to any long-distance charges, the fee for participating in a teleconference network costs approximately $10 to $30 per hour per site, depending on whether one uses a private carrier, a Bell system operator or a bridging company. (Smith, Report) Delivery over permanently installed lines such as KSU's, costs significantly less, but installation is much higher than the figures above.

In sum, it has been estimated that when instructors' salaries are added to the above figures, teaching by teleconference costs about $10 per student contact hour. (Bronstein)

As for the costs of some of the other programs described,

* the Gemini Blackboard costs approximately $12,000; an annual $15,000 grant to South Oak Cliff covers equipment rental for three Blackboards and use of the telephone lines. (Todd, Report)

* a teletype machine can be rented for $3000 per year. (Kenney, Report)

* Dial-a-Drill equipment, which includes a computer, digital speech system and twelve lines that serve 450 students, costs approximately $15,000 per year to rent. Software is rented at an additional $100 per line per year. (Fortune, Report)

* "The Computer Chronicles" software costs $69.95. Also needed are the "Writer's Assistant" word processing system and communication with the network via a "maildisk" or through subscription to The Source or Compu-Serve. (Riel, Report)

For the answer to the question, "Is it worth the cost?" one must immediately ask, "compared to what?" Knowing that they can reach students who would otherwise not be taught the material, or comply with regulations they would otherwise have difficulty meeting, or ease the burden on current staff, administrators of the programs described are uniformly enthusiastic.

What Issues Will I Face When Using Distance Education?

Ideally, teaching by distance will solve problems, not create them. Because it departs, however, from standard k-12 instructional methods, which are regulated at local, state and federal levels, distance education raises issues for policymakers. Assuming that you are considering enhancing current courses or adding courses currently unavailable in your curriculum (rather than closing the school and sending everyone home to learn), you are undoubtedly already wondering about the following questions:

* If I want to use a course taught from another state, what do I do if the teacher is not certified in my state?

* How can I assure that a distance course will be accredited for my school? And, if I provide many courses by distance, do I jeopardize my school's accreditation?

* What if the teacher assigns materials that have not been adopted in my state?

* I have to comply with student-teacher ratio laws. Can I do so and still use distance education efficiently?

* I get state money based on Average Daily Attendance. If my students learn somewhere else or from another source, what happens to my funding?

As is too often the case from the administrator's perspective, laws which were meant to protect and enhance education actually appear to contravene high quality, affordable education. The lawmakers, after all, could not imagine either the development of ITFS or an administrator's incentives for teaching by telephone. Teaching by distance is not new, however. Schools have twenty years' experience with instructional

television; some of the programs described have been in action for several years; and, post-secondary programs conducted by mail, television, radio and computer have raised similar problems. Thus a group of experts in telecommunications-based education and law has addressed these issues and offers responses to some of them.

Teacher certification.

(1) Several experts suggest that using a teacher of record will allow both compliance with the law and the ability to provide a course taught by a teacher whose training is superior to that of local teachers. If the teacher of record acts as a monitor and can therefore, be assigned additional teaching responsibilities, the double cost of using both a local and an imported teacher can be avoided. (Bransford, Report)

(2) Provisional certification offers a short-term solution. (Bransford, Report)

(3) Viewing the distant teacher as part of an instructional package also resolves the problem, although a local teacher of record will also be necessary. (Goldstein, Report)

Accreditation. More questions are raised than answered in this area. It is very likely that courses offered from a distance by an approved school to its local students will be accredited. This situation is supported by the increasing use of output measures rather than process measures to determine a course's or program's quality and suitability. Questions and doubts arise if a school offers a preponderance of its courses by distance so that "its" students are not in attendance. Given the well estalished structure of elementary and secondary education in the United States, this situation is not yet likely to arise; for the time being, it is hypothetical. Thus, as with teacher certification, accomodations can be made so that one does not risk abrogating the law.

A related question which could hypothetically jeopardize a school's accreditation could arise if a school realizes that it is less expensive and more educationally sound to invest in an electronic data base that is large and current than to maintain a legally required library that is small and perpetually out-of-date. Such questions, while still of the I-wonder-what-would-happen-if variety, lead some experts to believe that current state law will have to be changed. (Goldstein, Report)

Textbook adoption. In the age of interactive videotape which can simulate phenomena of natural science and of videotext which can provide news from around the world, even the term "textbook adoption" sounds antiquated. Nevertheless, it is a legal and policical reality that is confronted when a distant teacher assigns unapproved materials. It is recommended, if the state requires an approval process, that (1) the materials be submitted for approval and/or (2) the course be based on adopted materials with the additional materials being supplemental. (Goldstein, Report)

Class size. In some cases, distance education solves this problem by bringing together, over a distance, enough students to warrant hiring a teacher. In other cases, so many students can be brought together via telecommunciations that student-teacher ratio laws are contravened. While the situation is untested, it is possible that a certified teacher need not be present at every site and that an aide will suffice both pedagogically and legally. Because of the differences in the ways that instructional staff are used in distance learning programs and classroom teaching, this area of the law might also need to be redesigned. (Goldstein, Report)

Funding. For how much time each day must a student be in attendance at school in order to be counted in the ADA? How much of the school's

educational program must be locally provided in order to be eligible for public financial support? If one district beams instruction to the students of another district who gets to count the students? How can a school or district that develops and sends a course meet its costs which are likely to be higher than those of the receiving districts? These are the kind of questions that arise as distance education increases. Some responses follow.

(1) In the last case, it is common to either assess the receiving districts as if they were renting materials or to share the costs between sender and receiver as do districts that share common facilities.

(2) Schools continue to receive the formula funding to which they are entitled according to the number of students in attendance, regardless of where the courses originate. If the course is provided by a private organization rather than an approved, though distant, school, state funding continues to be generally available according to ordinary textbook or peripheral user fees. If the students do not attend school, then state home-schooling or handicapped education laws might apply. (Goldstein, Report)

(3) Because of the complexity of funding regulations and the variety of possible distance training arrangements, experts recommend that districts encourage state education agencies and legislatures to clarify their policies. Lessons from the experiences of post-secondary institutions, such as those researched by Project ALLTEL (Assessment of Long-Distance Learning via Telecommunications) also need to be watched. (Report)

What Can I Learn From This Guide?

Implicit throughout this Guide have been several principles and suggestions for what you can do. First,

The Lessons

1. Distance education works. It is being conducted across the curriculum at all grade levels with a variety of technologies at affordable cost. Research and experience indicate that it can be pedagogically and socially effective.

2. The principles of good classroom teaching apply to distance education as well, although additional teacher training in the techniques of effectively using particular technologies is important.

3. Effective administrative management is crucial for the successful continuation of distance learning.

4. Many distance learning programs result from cooperation with other organizations, including other school districts, universities and state agencies.

What Can I Do?

1. Consider the problems that your district faces and compare them with those being resolved by the programs described and referred to above. To what extent can teacher shortages, increased curricular or other governmental requirements, the needs of special populations, or decreased funding be met by distance education in your district?

2. Use the experience of others by:

* contacting the experts listed in "Resource Information"

* contacting SEDL

* using the "Reference List"

3. Investigate other educational resources in your state or region for cooperative action.

4. Investigate funding possibilities, such as Title V of the Higher Education Act of 1965 and the training and enhancement titles of the Elementary and Secondary Education Act for teacher development, as well as the Public Telecommunications Facilities Program.

5. Request guidelines from your state education agency on the policy issues addressed above. The Texas State Board of Education's Advisory Committee on Information Technologies and Telecommunications is examining these issues; other state agencies should be encouraged to do so as well.

RESOURCE INFORMATION: THE EXPERTS

Name	Area of Expertise
Dr. Louis Bransford Senior Vice President Confer Tech International Suite 1020 1300 N. 17th Street Arlington, Virginia 22209 (703) 525-3480	Teaching by Teleconference
Dr. Rickiann Saylor Bronstein Instructional Development Consultant University of Colorado Health Sciences Center 4200 East 9th Avenue Denver, Colorado 80262 (303) 894-8178	Teaching by Teleconference
Mr. Elliott Duchon Project Manager Instructional Computing, Teacher Evaluation, and Computer Centers Riverside County Schools P. O. Box 868 Riverside, California 92502 (714) 788-6530	Dial-a-Drill
Mr. Arnold Freitag Coordinator, Trade and Industrial Teacher Education University of Northern Iowa Department of Industrial Technology Cedar Falls, Iowa 50614 (319) 273-2561	Operation TECPAK
Dr. Jack A. Gerlovich Consultant, Science Education Department of Public Instruction Grimes State Office Building Des Moines, Iowa 50319 (515) 281-3249	PRISMS

Name	Area of Expertise
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Dr. Heather Hudson Department of Radio/TV/Film College of Communications University of Texas Austin, Texas 78712 (512) 471-4071	Telecommunications and education
Ms. Clarice D. Kenny Supervisor Caldwell Elementary Schools Caldwell Parish School Board P. O. Box 128 Columbia, Louisiana 71418 (318) 649-2680	Teletype
Ms. Jan Kruh Director Kansas Regents Network Umberger Hall 312 Kansas State University Manhattan, Kansas 66506 (913) 532-5995	TELENET
Joseph Lipson Group Director WICAT Systems, Inc. Box 5391875 S. State Street Orem, Utah 84058 (801) 224-6400	Evaluation of education by telecommunications

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Dr. Margaret Riel Assistant Researcher Laboratory of Comparative Human Cognition University of California San Diego D-0003 La Jolla, California 92093 (619) 452-2957	The Computer Chronicles
Alex Sanchez Associate Provost for Community Education Scholes Hall The University of New Mexico Albuquerque, New Mexico 87131 (505) 277-2863	Telecommunications and education
Dr. Martha L. Smith Division Director Educational Information Services Southwest Educational Development Laboratory 211 East 7th Street Austin, Texas 78701 (512) 476-6861	Planning for telecommunications-based education

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