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ABSTRACT

Rural schools can help solve their special education problems by using advanced technology to provide instructional support (computer managed instruction, satellite television, library searches, resource networks, on-line testing), instructional applications (computer assisted instruction, reading machines, mobile vans, instructional television), management tools (record keeping, special education networks, staff retention), and staff development (satellite inservice programs, videodiscs of strategies). However, implementing technologies in rural environments involves problems because of the state of the art of advanced technology (lagging software development, equipment incompatibilities, computer system constraints), fiscal inadequacies, staff development needs, and adverse rural attitudes. Rural school systems seeking to initiate the use of new technologies should seek external financial aid, consider local rural culture and norms, create community understanding and support, involve teachers in planning processes, build staff skills to implement technologies in unique rural special education situations, and design ways to ensure student participation. Eleven successful models of using technology to solve rural service delivery problems include obtaining information about service delivery and prescriptive programming and services; organizing and providing instructional programming information; parent training; community involvement; curriculum development; saving staff costs; improving communication between service providers and administrators; and serving homebound gifted, remotely located students in their own communities. (SB)

Technologies As Rural Special Education Problem Solvers — A Status Report And Successful Strategies

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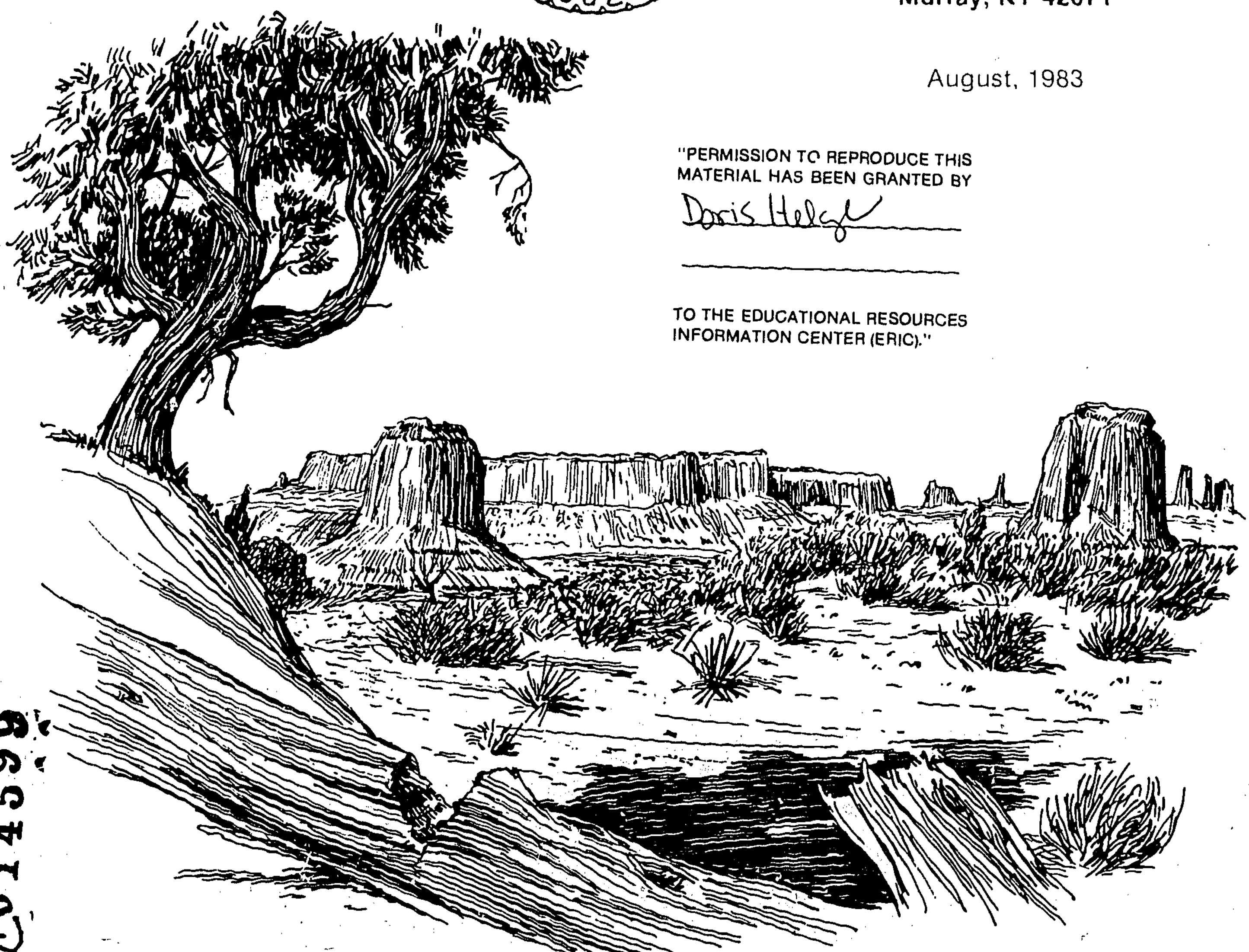

ABSTRACT

Advanced technologies are emerging in rural school systems. This article discusses the availability of a variety of new technologies and their primary uses for: (1) instructional support, (2) instructional applications, (3) management, and (4) staff development. Problems in initiating new technologies in rural environments and suggestions for successfully using them are discussed. Successful technological models and projected future uses are described.

TECHNOLOGIES AS RURAL SPECIAL EDUCATION PROBLEM SOLVERS -- A STATUS REPORT AND SUCCESSFUL STRATEGIES

INTRODUCTION

Technologies ranging from microcomputers to satellites are increasingly being used by schools across America. Their values range from global information dissemination systems to a tool for facilitating "seeing" by blind students and "hearing" by deaf students.

Modern technology offers particular benefits for rural schools. Many of the most frequently identified rural service delivery problems (e.g., professional isolation and difficulties caused by long distances between services and those needing them) can be partially ameliorated by increased use of advanced technologies.

Rural schools have generally had less accessibility to most forms of educational technology than non-rural schools (McCormick, 1983). The smallest and most isolated rural schools can potentially gain the most from the current technological flurry.

Availability and Use of Emerging Technologies

A 1983 National Rural Project study (Helge, 1983) involving 200 rural districts/ cooperatives representative of the U. S. indicated that a preponderance of rural school systems currently have at least one type of electronic technology available to them. Although most rural schools have had some type of technology (e.g., audio tapes, radio, instructional television, two-way TV, and teletype) for years, this study was primarily concerned with the emerging electronic technologies.

Microcomputers were most common, as indicated in Table 1 below.

Table I

TYPES OF TECHNOLOGY AVAILABLE TO RURAL DISTRICTS/COOPERATIVES SURVEYED

Type of Technology	Percent
Microcomputers	88%
Videodiscs	19%
Telecommunications	18%
Satellite Communications	2%
Other (voice synthesizer, specialized phone equipment, etc.)	21%
None	12%

States with the lowest levels of accessibility were in the "Deep South." In addition, a disproportionate number of Bureau of Indian Affairs school system respondents stated that their schools had no technology available.

Even though the vast majority (88%) of those interviewed had at least one microcomputer in their district, a surprisingly low percentage (only 18%) were linking these computers with telecommunications systems. Interactive applications of videodiscs and microcomputers were just beginning to be investigated by respondents.

Microcomputers were more popular in rural schools than were mainframes. Cost factors were reported to be responsible for this phenomenon. Respondents indicated that their rural districts/cooperatives could afford microcomputers but couldn't afford mainframe or minicomputers. They also reported that microcomputers were more accessible to remote locations so common to rural districts/cooperatives. Most of the respondents also indicated that microcomputers were more compatible with their isolation from university and state education agency mainframes (although some teamed their microcomputer with a mainframe or a minicomputer via a modem).

Satellites were primarily used in remote areas surrounded by vast land areas with sparse populations. One exception was a system reaching to Appalachia's small clustered towns.

The primary uses of technology identified were as follows.

Table II

PRIMARY USES OF TECHNOLOGY IN RURAL SCHOOL SYSTEMS

Use	Percent
Instructional Support and Instructional Applications	72%
Managerial Applications	42%
Inservice	8%

Instructional uses ranged from computer-assisted instruction via microcomputer to satellite-based instruction. Administrators varied their managerial uses from information retrieval to decision making and report generation. Inservice uses ranged from didactic to interactive. An overview of uses of technology occurs in the next section.

Uses of Technology to Solve Rural Special Education Problems

There are four primary uses of technology to solve rural special education problems. These include (1) instructional support, (2) instructional applications, (3) management tools, and (4) staff development applications.

1. Instructional Support

Computer-Managed Instruction (CMI) offers a computerized method of administering/evaluating tests, keeping records, and making decisions. CMI software is also designed to support the instructional system and provide diagnostic feedback regarding student performance.

Educational technology can improve the quality of education in rural school districts by giving students access to much more extensive curricular offerings. Amplified telephone systems afford students a chance to hear lectures or hold discussion sessions with persons from whom they are remotely located. Instructional television, including transmission via cable or special satellite, allows presentations on subjects that might otherwise be omitted from the small school special education curriculum.

Other electronic communication equipment such as computers not only enlarge educational content but encourage individualized learning. Small rural schools can also benefit from periodic visits by mobile teaching centers containing some of the electronic aids mentioned above.

The typical rural teacher has traditionally been a generalist, forced to prepare in many subjects but lacking specialized expertise. Availability of learning technologies makes specialization unnecessary and permits instructors to spend more of their time teaching basic skills or supervising individualized study through familiarity with a wide variety of content. Technology can also assist in overcoming isolation from urban cultural institutions. Music, plays, and other art forms can be transmitted electronically even to remote areas, thereby removing a key disadvantage of such locales. Library material and searches are also accessible through global information and dissemination systems such as The Source or Compuserve.

IEP goal/objective statements can be directly linked to assessment instruments accessed through currently available software data bases. Consistent curricula can then be developed.

With the advent of microcomputers, small schools that previously could not afford to access mainframe programs for monitoring schedules and follow-through aspects of student IEPs can now do so. Programs can also be accessed which facilitate the creation of reports from the centralized data base. Such reports generate decision-making data for teachers, related services personnel, and administrators.

Resource and information systems such as SpecialNet, its Rural Bulletin Board, statewide telecommunications systems, and global electronic communication systems are also available. These provide data bases of media, materials, and other human and program resources. As well as increasing knowledge regarding service options for rural handicapped children, such linkage systems partially overcome the feelings of isolation which contribute to burnout. Most of the above telecommunication systems allow personal conversations among rural special educators regarding daily problems as well as successful strategies.

Many rural teachers are finding that routine drill, reinforcement, and record keeping for their handicapped pupils can be computerized. Morale can be enhanced as educators have more time for actual teaching because technology handles routine paperwork and other repetitive aspects involved in a student's IEP. This is of tremendous benefit in understaffed rural school systems, particularly those in which a "generic" special educator is assigned students with multiple types of disabilities.

Word processing software capabilities are also a time saver for many generic rural special educators and others located in systems with inadequate curricular resources who must prepare their own curricula.

A great deal of software is appearing regarding testing procedures, including individual "on line" testing and rapid scoring/interpretation.

Modern technologies are facilitating interagency collaboration among many schools and human service agencies. Consistent with rural values, most have long been interested in cooperation. However, they have experienced barriers of distance to travel for mutual discussions, and inadequate time for such travel and face to face meeting. Agencies are also now electronically exchanging non-confidential diagnostic/ progress reports that will be of assistance to the student by better informing professionals. This ability to collaborate on service delivery on an as - needed basis is preferable to rural school consolidation.

Unique support systems are also being generated among remote rural families having children with similar disabilities. These families are developing the capacity to compare the effects of services delivery, home teaching, and availability of resources. The lack of parent support groups has been a considerable problem for isolated rural parents. As many ranches, farms, and other rural businesses now have microcomputers connected with global telecommunications systems, this approach does not always require the assistance of school personnel.

Similarly, communication between service providers and families is being strengthened via technology. This is sometimes as simple as locating a C.B. radio at the hub of a "holler" surrounded by geographical barriers. Typically, it involves exchanging videotapes among remotely located families and specialists.

2. Instructional Applications

Computer-Assisted Instruction (CAI) has the advantage of being interactive. The computer assumes a direct instructional role. CAI includes drill and practice, tutorial, simulation modeling, problem analysis, and instructional game possibilities.

Equipment such as the Kurzweil Reading Machine or the Optacon print reading aid are of particular importance to rural schools with inadequate specialists to teach those with low-incidence handicaps.

One or two-way instructional television also offers more diverse instructional alternatives for geographically isolated special needs populations. Satellite-based instructional delivery systems also exist, such as the Appalachia Community Service Network.

Mobile vans with specialized electronic equipment are becoming more frequent as a way of reaching students in remote locations whose school system lacks either full-time teaching specialists or extraordinary equipment. The vans may emphasize diagnostic and prescriptive foci or carry mobile electronic curricula.

Many disabled students are personally accessing statewide or national telecommunicatons systems described earlier to obtain service or instructional information. Many specialized pupil services, including vocational guidance and academic diagnostic and prescriptive activities, are now computerized.

Actual student experience with technologies can relate to realistic career alternatives for students with disabilities (e.g., computer programming positions that require little physical agility for individuals with physical disabilities).

3. Management Applications

Numerous urban school systems have for years used expensive mainframe computers to generate reports for local/ state requirements. However, it was not until the advent of the "little silicone chip" that this became a possibility for most rural districts. In fact, Alaska now has a system of developing interface capabilities for exchanging data and updating student files at each site of a district/cooperative or across the state. This is a particularly valuable concept for remote areas. The northernmost school system of this rural state links each educator/district by a network that enables routine direct computer to computer transfer of student, budget, and other types of information.

One frequently cited advantage of this system and others that are similar is more accurate record keeping, particularly for single administrators handling large geographic areas.

Rural special education administrators are frequently accessing national telecommunications systems such as SpecialNet and its Rural Bulletin Board, statewide systems, and The Source. The systems offer the advantage of quickly communicating with similar administrators across the country about rural special education problems and successful strategies.

Advanced instructional technologies including two-way television, instructional satellities, and microcomputers have actually facilitated staff differentiation. Cooperatives/ districts have been able to retain specialists such as an itinerant low-incidence teacher or a teacher of rural gifted children by sharing that person with other districts via instructional technology. Personnel retention results from cost savings (i.e., reduced layoffs) and from personal relief to the specialist (e.g., less time spent travelling).

In fact, some administrators reported that increased use of instructional technologies promote staff retention (Helge, 1983). Isolated special educators who can frequently communicate with those in similar circumstances feel much less professionally isolated. With the added personal benefits of being able to electronically secure cultural resources, many rural personnel who might otherwise flee isolated areas do not. It is even possible that more "high tech" jobs will be available for spouses or that spouses will be able to telecommute from "electronic cottages" when the full implications of the new information age are felt.

A "capital-intensive man-machine model" was designed by Swanson and Willett (1977) to reduce the labor intensity of rural education. The model reduced the numbers of professional personnel and increased the numbers of student workers used. Technological media and programmed instruction were heavily relied upon.

4. Staff Development Applications

Satellite inservice sessions allow participants to benefit from the knowledge and expertise of consultants/professors located great distances away. Such sessions are of particular benefit to rural special educators when they include demonstrations of techniques of working with low-incidence handicapping conditions. While didactic staff development sessions can be helpful and are often all that is feasible, interactive sessions can frequently be arranged via two-way television or satellite transmission.

As a follow-up or separately, mailing videodiscs of an educator's strategies with children with disabilities to a specialist/consultant for feedback is a valuable strategy.

Accessing information systems via telecommunications is a staff development technique that does not need to be limited to informal access of the system because of an immediate need. Grouping teachers/administrators to discuss optimum benefits from such a system is advisable. Formal computer-assisted instruction can, of course, be a learning technique used by the teacher as well as by students. This has been accomplished by mailing appropriate software to teachers and by a mobile inservice van equipped with computers.

PROBLEMS WITH IMPLEMENTING TECHNOLOGIES IN RURAL ENVIRONMENTS

The problems experienced by those implementing advanced technology in rural environments may be grouped into four categories. These include: (1) the state of the art of advanced technology, (2) fiscal inadequacies, (3) staff development needs, and (4) adverse rural parent/community attitudes.

1. The State of the Art of Advanced Technology

While significant progress has occurred in computer hardware development, similar gains have not occurred in software development. Most software lacked input during development from special educators. A primary problem for special educators is that few technology designers, especially computer programmers, have had knowledge of special education. Many well-composed programs have been poorly suited to classroom use of integration with existing curricula.

Even fewer programmers have understood rural constraints and issues. Communications among developers and potential users have generally been poor. Confusion, and some differential pricing, have been caused by the myriads of vendors in the field. Sales organizations have confounded this problem by a lack of follow up or servicing, after installation.

Incompatible equipment, such as with microcomputers or videodisc player equipment and the inability to copy videodisc software are frequently problems. Software incompatability has prohibited sharing of data bases.

Ownership (copyright) guidelines, particularly for satellite receptions, are not yet clear. FCC regulations have not necessarily been developed to fit the rural school situation.

Problems also exist with both direct access computing systems and mainframe or "service bureau" systems. Direct access systems are those used directly by special education personnel via microcomputer or a terminal connected to a time-shared computer. This type of system commonly offers low expense as compared to mainframe systems, but it requires staff training. This system has disadvantages including downtime due to "crashes" during peak use, problems over priorities of usage, and the expense of use, including long distance charges.

Mainframe systems require teachers to complete forms, cards, etc. Data are sent to computer operators at another location, the central computer processes the forms, and printed reports or IEPs are returned. This system gives no immediate access to the data base. Nor can one readily edit or change it. Extensive turnaround time is also a negative factor, expecially in remote areas.

2. Fiscal Inadequacies

The primary monetary problems have been associated with acquisition of hardware and software. However, rural schools are now becoming more impressed with monetary needs for staff training.

Front end costs associated with capitalization of instructional technology hardware (and some software) are the greatest share of total costs. "Front end" costs are often underestimated. Rental of telecommunications lines and long distance charges, in general, are also major costs. The potential for higher costs of rental lines appears to be increasing.

In addition, ongoing costs are somewhat difficult to predict, since much of the equipment is new and its actual "useful life" and "track record" have not yet been determined. Longevity of equipment is yet to be determined in many instances. Some equipment costs soar because new and better products are developed each day. Many innovations such as adaptations of laboratory science equipment may take years to be acquired by schools because of their initial expense.

Initial costs are usually originally felt high by many school boards but later felt to be minimal compared to benefits being received. However, initial costs for developmental time frequently are overrun, and difficulties in finding experts to assist with computer usage and programming are reported to be frequent in rural America (Helge, 1983).

Rural schools have received few company donations of hardware. Rural school personnel are frequently less adept at asking for corporate donations or for grants.

3. Staff Development Needs

Complaints about the use of new technologies have included staff illiteracy and apprehension about computers, personnel needed for training others to use new technologies, staff resistance to procedures changes, human error factors, and unrealistic expectations of technologies. Rural schools have less adequate staff development programs to begin with, and staff training is particularly difficult in rural America where personnel attrition rates of 40% are not uncommon.

4. Adverse Rural Parent or Community Attitudes

Rural communities value tradition and direct personal contact. Technology is often perceived as an alien influence. Gaining parent and community acceptance is essential. This is especially true when strategies include improvement of parent-educator communication, or parent involvement via technology. Rural systems that neglect parent/community attitudes typically find that their efficient parent training systems are not used whether they be via remote electronic communication, TV signal transmissions, or simpler methods such as exchanging training and observation videotapes.

SUGGESTIONS FOR INITIATING USE OF NEW TECHNOLOGIES IN RURAL SCHOOL SYSTEMS

Rural schools offer a unique laboratory for developing and testing new ways of providing education to handicapped students. Critical variables for successful new efforts include those listed below.

1. Seek External Financial Aid.

Corporate donations have thus far been primarily available to urban school systems with relatively high visibility for the donor industry. It is time to make known to corporations, private foundations, and community organizations the inequities in the availability of technologies for rural schools. Approaching corporations producing rural-focused commodities should be a first step. Even a small donation can serve as "seed money" for larger grants.

Computer corporations that are approached should understand that the rural school system values donations of software or staff training time and resources as well as hardware. Potential tax deductions and visibility for the corporation should be stressed. Although most foundations are not rural-focused, foundations would value the fact that a rural school system had been able to obtain seed money from corporations or local community organizations. Local businesses or civic organizations may not only be interested in donating equipment or staff training expertise but also may be interested in sharing equipment. Local enterprise and clubs could gain a substantial amount of positive public recognition (and potential tax write-offs) from sharing equipment or the time of equipment operators who could process information.

2. Consider Local Rural Culture and Norms.

The "high tech-high touch" approach described by Naisbitt (1983) involves personalizing the use of new technologies. It is particularly apropos for rural America and can be used to generate support of the rural community. Some of the more successful rural technological innovations have been designed to use existing rural grapevines or to increase the "high touch" approach of rural neighbor helping neighbor.

3. Create Community Understanding and Support.

Use of new technologies must be "sold" not only to school personnel but to the total community. This is particularly important when attempting to overcome fears of technology generated by the "no hands on" era in which most adults were educated. Offering concrete, "hands on" evidence of technology utilization will usually result in a high degree of student feedback and parent acceptance (e.g., a computer printout which a student can take home to share with parents). School personnel should make special efforts to educate their rural community regarding positive implications including potential student employment in "information society" jobs. Information should be disseminated regarding concrete results in instructional effectiveness and student change resulting from implementation of advanced technologies. The effects of students' involvement with technology on their future living, including their careers, should be emphasized.

4. Involve Teachers in Planning Processes

Teachers who initiate the use of technologies accept them better than when they are initiated by administrators. The adept rural administrator will involve teachers in planning and developmental processes.

As with many aspects of rural administration, it is important to remember that continued local enthusiasm for implementation is often due to the efforts of one individual teacher advocate. Such an individual should be identified and his/her support cultivated. Administrative and school board advocates are also helpful.

Organizing and involving an interested and enthusiastic staff group (particularly rural teachers) will assist in determining what cognitive and affective approaches are needed for acceptance and use. This group will want to seek advice from other rural practitioners using the same technology before adopting/adapting it for the school system. The assistance of related state and national agencies dedicated to the use of technology should also be sought. Technologies selected for implementation should be flexible, use existing equipment/capabilities, be "user friendly," and permit sharing of data bases.

As with any change process in rural America, it is wise to begin on a small scale and ensure that success is what will be reported by the highly efficient rural grapevine. Likewise, flexibility in planning, implementation, and maintenance strategies employed is essential.

Fragmentary approaches to curriculum development in introducing technologies should be avoided. Implementation should be a school wide, if not a total district, effort. It should be a part of orderly curriculum development. A new technology should be as close as appropriate to the regular learning situation, rather than a "pull out" activity.

5. Build Staff Skills to Implement Technologies With Unique Rural Special Education Situations.

Administrative support is essential to introduce the use of machines in tradition-oriented communities which typically place the greatest value on one:one personalized approaches. Staff must understand that technologies can be used effectively to supplement, not supplant, the efforts of rural teachers. Rural systems will find that inservice training monies are a wise investment. An important part of any staff training session will include desensitizing rural staff to work with technologies. It should clarify the reasons the technologies are being used in the rural system and emphasize advantages for the teacher such as time saved, access to remote resource data banks, etc.

Because most rural teachers derive their job reinforcements from positive interactions with students, experiential inservice training must emphasize that technologies do not substitute for teacher-student interaction. Rural schools should also express their inservice and preservice training needs to university preparation programs.

6. Design Ways to Ensure Student Participation

Student participation will most likely be enhanced if technologies are readily available in the classroom or associated with greater student scheduling flexibility. Extensive efforts should be made to teach students the immediate and career opportunities available through technologies.

SUCCESSFUL MODELS OF USING TECHNOLOGY TO SOLVE RURAL SERVICE DELIVERY PROBLEMS

Techniques relevant for handicapped children in a variety of geographical settings (e.g., a speech synthesizer) are not noted in this section. Rather, selected examples of successful uses of technology to solve rural problems are discussed.

Due to the need for brevity, only eleven examples are included. These models illustrate successful uses of technology in a variety of rural settings and with diverse groups of individuals. The purposes of utilization represented include direct instruction, instructional support, management, and staff development.

1. <u>Obtaining Service Delivery Information</u>

   The ACRES "Rural" Electronic Bulletin Board is operated by the American Council on Rural Special Education (ACRES). It is one of the special-education focused electronic bulletin boards contained in a telecommunication system operated by SpecialNet, a telenet system of the National Association of State Directors of Special Education. The ACRES Rural Bulletin Board is free of charge to any person or agency having access to SpecialNet. The Bulletin Board offers information about (a) conferences related to rural special education, (b) samples of successful practices appropriate for specific types of rural subcultures, (c) items related to the ACRES Rural Job Referral Services, (d) Federal and state policies with importance for rural handicapped individuals, (e) access to the ACRES Resource Network, and (f) lists of recent publications concerning rural special education. Because the board is part of the SpecialNet telecommunications system, readers are encouraged to use its electronic mail capabilities to communicate directly with other readers.

   The National Rural Independent Living Project of Murray State University operates computerized resource systems in rural communities across America. The project is designed to locate and make available resources (transportation, assistance in the home, etc.) to disabled persons in rural communities who can, because of such resources, live independently. Each community system has a self-contained local resource system plus accessibility to a national resource and information exchange system.

2. Organizing and Providing Information for Instructional Programming

The North Slope Borough School District of Alaska uses a computer-assisted management system to organize special education programming. The system assists in development of the IEP, and generates various reports required to meet the provisions of PL94-142. The computer program handles the repetitive paperwork aspects of creating and managing IEPs. For example, district administrators developed curriculum that linked many IEP goal/objective statements to assessment instruments. This provided a criterion-referenced inventory related to performance analysis on more than 200 key skills in reading and math. Content areas ranging from study skills to sensory perception skills were also included in the computer program.

Thus, curricula in the district's data base can be accessed for use in creation of an IEP. Evaluations have been positive, particularly because the system provides more time for teachers to teach (vs. complete paperwork). The district's computerized system also manages all facets of the day to day delivery of special education services. Up to 1,000 items of information can be stored/retrieved on each special education student. Administrative paperwork has been speeded up, partly because of the capabilities of the system to quickly generate accurate reports. The system requires a minimum of staff training.

3. Remotely Gathering Data for Prescriptive Programming and Services

A Head Start program in Otsego County, New York uses videotapes in which a child reacts to a structured sequence of situations as input for prescriptive programming. Children involved are located in remote locations, and the videotapes are sent to and viewed by staff at a more centralized rural facility. The input from such staff is used by local personnel for planning prescriptive programming for the child and for locating agencies which can best provide appropriate services. The tapes become a permanent part of the child's records against which subsequent recordings are compared. Testing the child in his home-school situation eliminates "clinical" aspects which often affect his performance.

4. Parent Training

Videotapes are the primary vehicle for training parents of children with hearing impairments to work with their children in a program implemented in Newfoundland. The program involves a 4-day residential workshop for the remotely located parents and their children in which parents view teaching videotapes produced as part of the project. Training videotapes are later sent to the families on a monthly basis for use with their loaned videotape playback units. An auditory trainer is also furnished to parents for use at least once per day in one:one language teaching sessions with children, as described on the videotapes. The program has tremendously limited the number of staff needed for home visits. A visiting teacher visited each home once per semester and conducted weekly telephone counseling sessions with parents. Considerable improvement was noted in parenting behavior and child performance.

5. <u>Parent Communication/Involvement</u>

A notable inexpensive approach of communicating with parents in rural Appalachia "hollers" that are hard to reach because of their terrain, involved placement of C.B. radios in the "hub" of the holler (community). The excellent natural communication system allowed relatively quick access to parents as well as needed and reliable communication grapevines to carry messages.

More sophisticated "instant" communication systems for service providers and families typically involve telecommunication.

6. <u>Increasing Curricular Offerings</u>

A high school in Littlefork, Minnesota, facing a decline in quality because of dwindling school population, inflation, and fewer resources, designed a system allowing it to offer 178 courses to 78 high school students. Four outside resources, typically used as supplements to courses, were combined to make one curriculum package. These included computer courses, correspondence courses, audiovisual resources, and video tape recorders. The district set aside a classroom in the high school for its "one room schoolhouse" and equipped it with study carrels, computers, and other electronics. A manager uses diagnostic records, counseling, contracts, and other student learning devices. Individualized learning goals and styles are emphasized. Resources used in the center have been reported to be cost effective (e.g., cost per hour for a computer-taught course is $5.49). Discipline problems have been reported as exceptionally low because of a high level of student motivation.

7. <u>Saving Staff Costs/Labor Intensity</u>

The need to reduce the numbers of professional personnel required was the initiative for a short-staffed remotely located learning center to rely heavily upon the use of technological media and programmed instruction. A model designed by Swanson and Willett (1977) used ten learning areas of individualized instruction for 1200 rural students. Each learning area corresponded to subject matter and was supervised by a resource specialist (teacher) or a special service teacher. A teacher-senior for diagnosis and curriculum supervision and an administrator completed the professional staff of 12 for the center. Local paraprofessional personnel included 18 adults and 22 students. Thus the number of student workers and paraprofessional staff made the project much less professionally labor intensive. Several types of hardware and software were available at each learning center, and students worked individually through prescribed program materials which had built-in evaluators and reinforcers. Staff reduction paid for a large portion of necessary technological and other media materials, and the model was judged cost efficient.

8. Instant Communication/Feedback Between Service Providers and Administrators or Monitoring Agencies

Telecommunication systems allow administrators to participate in case conferences without being physically present. This is particularly valuable when responsible administrators are located great distances from the site of IEP meetings and service providers. Some such systems are implemented at the district level.

A statewide audio teleconferencing network interconnects educational providers and receivers in isolated, rural areas of Montana. The system involves live interactive audio with occasional computer networking to provide programming to small, rural, isolated educational institutions and communities across the state. Housed at Eastern Montana College, the system serves 47 sites. These include both schools and other community agencies. Educational offerings are available at all levels including junior-senior high school courses, college courses, and inservice coursework for teachers K-12. Statewide educational meetings held via the system eliminates expensive and time-consuming travel.

Electronic mail systems have enabled the agency delivering services and its supportive/monitoring agency to instantly communicate regarding problems, potential resources, etc.

9. Allowing Remotely Located Students to Stay in Their Communities Rather Than Attending Residential Schools

Small populations of school-aged children in Alaska for years necessitated that many communities sent many of their special needs and high school students to larger communities for instruction. Such "specialized" instruction was not feasible in smaller communities, due to lack of specialized staff, equipment, etc., available. Satellite instruction to remote communities has enabled many Alaskan students to stay in their home communities instead of attending residential facilities. A continuum of services has been designed which ranged from totally home-based education with satellite instruction to short-term or long-term boarding school instruction.

10. Serving Homebound Students

Homebound students may be served via telecommunications (through a telephone hookup in the child's home). This also increases communication between the student and teacher about learning difficulties.

A television placed in the student's home, depending on the sophistication and resources of the geographical area, can be used to transmit educational programs (designed/produced by the state or district). Alternatively, the classroom setting can be broadcast to the home. Broadcasting may occur via one-way audio (didactic) from class to home or two-way audio (interactive instruction).

11. Challenging Gifted Students

The advanced studies of gifted students, ages 8-12 at Calhoun County High School in Grantsville, West Virginia, include introductions to computers and programming, telecommunications systems, and programmed instruction. Project REACH (Raising Educational Achievement by Changing Horizons) includes the supervisor for special education and a teacher/ program facilitator as sources of support.

SUMMARY

Technological equipment, information, experience, and expertise offer tremendous potential for rural administrators, educators, and disabled students. The use of modern technology assists in overcoming serious service delivery problems consistent with sparse populations, scarce resources, and difficult terrain. In fact, rural school and related agency networking has already rapidly increased, and numerous interagency agreements to share equipment among rural areas have emerged.

Technology can strengthen ties between rural community and school. In fact, it can actually assist rural schools in shattering the stereotypes of stagnant rural communities and school systems. The potential for application of emerging technologies is limited solely by the imagination of those planning and implementing them.

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