DOCUMENT RESUME

ED 331 483 IR 014 969

AUTHOR Lion, Margaret
TITLE Directory of Distance Learning in the Mid-Atlantic Region 1990.
INSTITUTION Research for Better Schools, Inc., Philadelphia, Pa.
SPONS AGENCY Office of Educational Research and Improvement (ED), Washington, DC.
PUB DATE 90
CONTRACT 400-86-0003
NOTE 58p.; A product of the Rural Education Project.
PUB TYPE Reference Materials - Directories/Catalogs (132) -- Reports - Descriptive (141)

EDRS PRICE MF01 Plus Postage. PC Not Available from EDRS.
DESCRIPTORS *Distance Education; *Educational Technology; Elementary Secondary Education; Program Evaluation; *School Districts
IDENTIFIERS Delaware; Maryland; New Jersey; Pennsylvania

ABSTRACT

This directory is a resource guide to distance education programs operating in the Mid-Atlantic states served by Research for Better Schools: Delaware, Maryland, New Jersey, and Pennsylvania. The purposes of the directory are to provide (1) a brief overview of the distance learning programs currently operating (in the fall of 1990) in these four states; and (2) the names, addresses, and telephone numbers of contact persons in the states and in local school districts whom the reader might wish to contact for additional information. Each entry includes the following information: contact person, school district involved in the program, type of technology, support technologies, number of years of program operation in the district, course or courses being taught, number of students per course, teacher/facilitator training, and costs for both installation and maintenance. In addition to this information, the contact persons have provided a brief view of the program's strengths and/or weaknesses. A distance learning matrix of the major features and types of technologies, brief descriptions of the types of technologies identified (instructional television fixed service--ITFS, communications satellites, cable television, and computer networks), and a glossary of terms are appended. (DB)

DIRECTORY OF

DISTANCE LEARNING

IN THE MID-ATLANTIC REGION

1990

Margaret Lion
Research & Dissemination Assistant

Rural Education Project
Research for Better Schools
444 North Third Street
Philadelphia, PA 19123-4107

This publication is based on work sponsored, wholly, or in part, by the Office of Educational Research and Improvement (OERI), Department of Education, under Contract Number 400-86-0003. The content of this publication does not necessarily reflect the views of OERI, the Department, or any other agency of the U.S. Government.

TABLE OF CONTENTS

INTRODUCTION.....1

DESCRIPTIONS OF STATE PROGRAMS

DELAWARE.....3

MARYLAND.....21

NEW JERSEY.....31

PENNSYLVANIA.....37

APPENDICES

A. DISTANCE LEARNING MATRIX.....A-1

B. TYPES OF TECHNOLOGY.....B-1

C. GLOSSARY.....C-1

INTRODUCTION

The Directory of Distance Learning in the Mid-Atlantic Region is a resource guide to distance learning programs operating in the Mid-Atlantic states which Research for Better Schools serves: Delaware, Maryland, New Jersey, and Pennsylvania.

The purposes of the directory are to provide (1) a brief overview of the distance learning programs currently operating (in the fall of 1990) in these four states and (2) the names, addresses, and phone numbers of contact persons in the states and in local school districts whom the reader might wish to contact for additional information.

Each entry includes the following information:

- Name, address, and phone number of the school district
- Contact person(s)
- School district or districts involved in the program (Some programs include many districts.)
- Type of technology
- Support technologies
- Number of years of program operation in the district
- Course or courses being taught
- Number of students per course
- Teacher/facilitator training
- Costs, both for installation and maintenance

In addition to the program information noted above, the contact persons have provided a brief view of the program's major strengths and/or weaknesses.

The directory also includes the following appendices: a distance learning matrix of the major features and types of technologies; descriptions of the types of technologies that have been identified; and a glossary of terms.

RBS hopes this directory will be a useful tool for creating (and/or expanding) distance learning programs and for identifying potential partners in this process.

For further information on distance learning, please call RBS' contact person -- Margaret Lion, (215) 574-9300, ext. 230.

DESCRIPTIONS OF DELAWARE PROGRAMS

STATE CONTACT(S)

Dr. William Geppert
Delaware State Department
of Public Instruction
Townsend Building
P.O. Box 1402
Dover, DE 19901
(302) 739-4888

APPOQUINIMINK SCHOOL DISTRICT

Middletown High School
504 South Broad Street
Middletown, DE 19709
(302) 378-5000

CONTACT PERSON

Richard Sutor

SCHOOL DISTRICT(S)

Appoquinimink School District

TYPE OF TECHNOLOGY

Satellite

SUPPORT TECHNOLOGIES

VCRs, TVs

YEARS OPERATING IN SCHOOL/DISTRICT(S)

2 years

COURSE(S) BEING TAUGHT

The satellite is used for supplementing foreign language classes by using broadcasts from Montreal. Science classes are supplemented through NASA programs. Teacher inservice programs from Arts and Science Teleconferencing Service (ASTS) also are received by the school.

NUMBER OF STUDENTS PER COURSE

Approximately 100-125 students view programs received from the satellite each day.

TEACHER/FACILITATOR TRAINING

The training process takes about two days. The librarians, library assistants, and Middletown High School teachers are being trained to operate the satellite dish. They will aid teachers in selecting programs to be recorded and watched and will align the dish for receiving transmission.

COST

- **INSTALLATION** - Approximately $2,000 to purchase and install dish
- **MAINTENANCE** - Not available

STRENGTHS OF PROGRAM

Using the satellite dish can bring previously unavailable materials to the classroom.

WEAKNESSES OF PROGRAM

The Middletown program is still in its pilot stage. Program directors still strive to integrate the satellite programs into the curriculum.

NOTES

Middletown High School hopes to partner with the local cable company, Telemedia Association, to bring cable hook ups into the high school for broadcasting to other schools in the district.

CAPE HENLOPEN HIGH SCHOOL, LEWES JUNIOR ANNEX PROGRAM

Cape Henlopen High School, Lewes Annex
James Moore Building
Savannah Road
Lewes, DE 19958
(302) 645-6288

CONTACT PERSON
Alan Campo

SCHOOL DISTRICT(S)
Cape Henlopen School District

TYPE OF TECHNOLOGY
Satellite

SUPPORT TECHNOLOGIES
There are VCRs in the classrooms.

YEARS OPERATING IN SCHOOL/DISTRICT(S)
1 year

COURSE(S) BEING TAUGHT
All of the science classes use the satellite facilities - biology and physics; life, earth, and space sciences. The school receives courses from ASTS.

NUMBER OF STUDENTS PER COURSE
130-200 students watch the satellite programs in an auditorium.

TEACHER/FACILITATOR TRAINING
There is no training for the teachers; the only facilitator is Alan Campo, who presents the programs the students.

COST

- **INSTALLATION** - $2300 - This price is for two dishes; one is attached to the school building and the other, a mobile dish, is hooked-up at different school sites.
- **MAINTENANCE** - $100 total preventive maintenance for both dishes

STRENGTHS OF PROGRAM
Students access information and talk to people they could never contact before. Students have talked to astronauts and have watched them work in the space shuttle while orbiting Earth.

WEAKNESSES OF PROGRAM
Scheduling the programs can be difficult, since classes and programs are sometimes not on the same timetable.

NOTES
Cape Henlopen High School, Lewes Annex, received money from the Christa McAulliffe Science Grant. The grant money is to be used to teach students about different job opportunities in science fields. Campo is hoping to

donate the tapes they have made to the Delaware Department of Public Instruction to be used by teachers and students throughout the state. The satellite also is used for two way teacher teleconferencing and inservice training.

W.T. CHIPMAN JUNIOR HIGH SCHOOL

Center Street
Harrington, DE 19952
(302) 398-8197
FAX: (302) 284-4491

CONTACT PERSON
James Boyd

SCHOOL DISTRICT(S)
Lake Forest School District

TYPE OF TECHNOLOGY
Satellite

SUPPORT TECHNOLOGIES
A TV in each classroom, 5 VCRs in the building

YEARS OPERATING IN SCHOOL/DISTRICT(S)
Started in 1990-91 school year

COURSE(S) BEING TAUGHT
There is an extended homeroom each day so the students can view the Channel One news broadcast. Primarily social studies and science classes use the programs from Whittle Communications to supplement class materials.

NUMBER OF STUDENTS PER COURSE
475 students watch Channel One per day.

TEACHER/FACILITATOR TRAINING
When the equipment was installed, the installers showed the staff how to turn on the equipment. Training was not necessary for using the technology.

COST

- **INSTALLATION** - No cost - Whittle Communications pays for installation.
- **MAINTENANCE** - No cost - Whittle Communications pays for maintenance.

STRENGTHS OF PROGRAM
Viewing Channel One provides the students a view of the world outside of their community, giving them a global perspective on news items.

WEAKNESSES OF PROGRAM
Some people did not like the students watching two minutes of commercials each day as part of the Channel One broadcast.

NOTES
Having the technology and programs has given the school different opportunities. For instance, student council speeches are now played over the VCR/TV system throughout the school. This saves the time required for an assembly. Math classes watch the same program at the same time over the TVs without having to move to a bigger room to accommodate all of the students.

CHRISTINA SCHOOL DISTRICT

83 East Main Street
Newark, DE 19711
(302) 454-2000
FAX: (302) 454-5380

CONTACT PERSON

Vern Wolf, Director of Secondary Education

SCHOOL DISTRICT(S)

Christina School District

TYPE OF TECHNOLOGY

Christina's three high schools each have a satellite dish.

SUPPORT TECHNOLOGIES

VCRs, portable TV monitors

YEARS OPERATING IN SCHOOL/DISTRICT(S)

3 years

COURSE(S) BEING TAUGHT

No one specific course is taught with the satellite. Teachers in the high schools use the dishes to pick-up supplemental materials for their classes. Foreign language classes use the dish the most extensively. Inservice programs for teachers also are received.

NUMBER OF STUDENTS PER COURSE

300 foreign language students per day view programs picked-up from the satellite dish.

TEACHER/FACILITATOR TRAINING

Teachers were given brief instructions on using the equipment by the equipment suppliers.

COST

- **INSTALLATION** - Not available
- **MAINTENANCE** - Not available

STRENGTHS OF PROGRAM

Teachers in any subject area can use programs received from the dish to enhance their courses.

WEAKNESSES OF PROGRAM

Schools need an expanded staff to help operate the program.

DELAWARE TECH-GEORGETOWN CAMPUS

Delaware Tech-Georgetown Campus
P.O. Box 610
Georgetown, DE 19947
(302) 856-5400
FAX: (302) 856-5392

CONTACT PERSON
Larry Sharp

SCHOOL DISTRICT(S)
The program can reach any school district in the state of Delaware.

TYPE OF TECHNOLOGY
Satellite

SUPPORT TECHNOLOGIES
VCRs and TVs

YEARS OPERATING IN SCHOOL/DISTRICT(S)
1 year

COURSE(S) BEING TAUGHT
Teleconference workshops range from Hazardous Material Education to Drug and Alcohol in the Workplace Videoconference for Delaware educators.

NUMBER OF STUDENTS PER COURSE
A range of 30-100 participants attend the teleconferences. The most common range is 30-40.

TEACHER/FACILITATOR TRAINING
Teachers do not need to be trained since they are not operating the technology.

COST
- **INSTALLATION** - Not available
- **MAINTENANCE** - Not available

STRENGTHS OF PROGRAM
The satellite teleconference can target a narrow interest group and choose specific topics on which educators need information.

WEAKNESSES OF PROGRAM
Due to the number of teleconferences being offered, programmers have a difficult time choosing programs. Also, the cost of the teleconferences has risen.

DELAWARE TECH-TERRY CAMPUS

Delaware Tech-Terry Campus
1832 North DuPont Parkway
Dover, DE 19901
(302) 739-6168

CONTACT PERSON
Kevin Smith

SCHOOL DISTRICT(S)
The program serves school districts from all over the state.

TYPE OF TECHNOLOGY
Satellite

SUPPORT TECHNOLOGIES
VCRs

YEARS OPERATING IN SCHOOL/DISTRICT(S)
3 years

COURSE(S) BEING TAUGHT
Delaware Tech tapes programs that are of value to teachers in the field. Programs range from AIDS education to RE: Learning to governor's conferences. Educators come from the entire state to participate in the programs.

NUMBER OF STUDENTS PER COURSE
An average of 40-100 educators participate in each program.

TEACHER/FACILITATOR TRAINING
Training is not needed since the teachers participate and the staff at Delaware Tech run the program.

COST

- **INSTALLATION** - $3,000
- **MAINTENANCE** - The only maintenance cost is the license fee for taping a program.

STRENGTHS OF PROGRAM
The program allows teachers to participate in national programs and teleconferences.

WEAKNESSES OF PROGRAM
During a two-way communication link, participants experienced difficulty in phoning in their questions to the speakers.

NOTES
Delaware Tech is hoping to make tapes of programs available to the Department of Public Instruction.

INDIAN RIVER SCHOOL DISTRICT

Central Office
R.D. #2, Box 236
Frankford, DE 19945
(302) 436-1000 ext 48

CONTACT PERSON

Carl R. Bartell, Computer Systems Manager

SCHOOL DISTRICT(S)

Indian River School District

TYPE OF TECHNOLOGY

Satellite

SUPPORT TECHNOLOGIES

VCRs are in some classrooms.

YEARS OPERATING IN SCHOOL/DISTRICT(S)

The program began this year.

COURSE(S) BEING TAUGHT

Channel One, a program produced through Whittle Communications, is the major course but it is not part of any particular classroom. Twelve minutes of non-instructional time has been dedicated for watching Channel One broadcasts.

NUMBER OF STUDENTS PER COURSE

An average of 30 students watch the broadcast.

TEACHER/FACILITATOR TRAINING

There is no training for the teachers; however, study guides are provided by Whittle Communications each month for the teachers. The building sponsors have been given instruction by Whittle Communications in the use of the video equipment and the video distribution system.

COST

- **INSTALLATION** - No cost - Whittle Communications provides technology without cost.
- **MAINTENANCE** - No cost - Whittle Communications provides maintenance without cost.

STRENGTHS OF PROGRAM

Students now watch 12 minutes of world news every school day. The video equipment is available for other school uses.

WEAKNESSES OF PROGRAM

Channel One shows commercials along with the news program.

NOTES

Viewing Channel One is a supplemental part of the day rather than the focus of one class. Whittle Communications operates by giving a school a dish, TVs, and VCRs when the school signs up for services. In return, Channel

One broadcasts its current affairs program as well as non commercial instructional programming called the "Classroom Channel."

LAUREL HIGH SCHOOL

1133 South Central Avenue
Laurel, DE 19956
(302) 875-6120

CONTACT PERSON
Karen Beck

SCHOOL DISTRICT(S)
Laurel School District

TYPE OF TECHNOLOGY
Satellite

SUPPORT TECHNOLOGIES
TVs in homeroom classrooms, 2 VCRs in the school

YEARS OPERATING IN SCHOOL/DISTRICT(S)
Program was installed at the beginning of the 1990-91 school year

COURSE(S) BEING TAUGHT
Channel One is shown every day in homeroom. History and health classes will use taped programs to supplement their courses.

NUMBER OF STUDENTS PER COURSE
500 students per day watch Channel One.

TEACHER/FACILITATOR TRAINING
No training of the teachers was necessary. The people who installed the equipment showed the teachers how to turn on the satellite dish.

COST

- **INSTALLATION** - No cost - Whittle Communications provides the equipment and covers installation fee.
- **MAINTENANCE** - No cost - Whittle Communications covers the maintenance cost.

STRENGTHS OF PROGRAM
Students learn about the world outside of their community by viewing the Channel One news broadcast.

WEAKNESSES OF PROGRAM
When the dish needs repairing, it is time-consuming to call Whittle Communications and have them call the repair people.

RED CLAY SCHOOL DISTRICT

Wilmington High School
1400 Washington Street
P.O. Box 869
Wilmington, DE 19899
(302) 651-2700

CONTACT PERSON
Parker McMullen

SCHOOL DISTRICT(S)
Red Clay School District

TYPE OF TECHNOLOGY
Satellite

SUPPORT TECHNOLOGIES
A thermograph and a barograph are used for making records of temperature and air pressure.

YEARS OPERATING IN SCHOOL/DISTRICT(S)
The school has had the satellite for two years, however, it has been down for the last year due to needing repairs.

COURSE(S) BEING TAUGHT
The satellite dish is designed specifically to receive weather information. The satellite dish is used to supplement science courses with weather information.

NUMBER OF STUDENTS PER COURSE
15 students per day aid in operating the satellite dish.

TEACHER/FACILITATOR TRAINING
Parker McMullen attended a workshop on operating satellite dishes.

COST

- **INSTALLATION** - $17,000 which included the cost of the weather radio and the special printer
- **MAINTENANCE** - Approximately $200 per year

STRENGTHS OF PROGRAM
The satellite provokes the students' interest, causing them to ask questions about the weather and the dish.

WEAKNESSES OF PROGRAM
The use of the satellite could be improved by creating a place in the curriculum and encouraging student ownership of the program.

NOTES
The satellite has been inoperative for the past year due to a robin building a nest on the downlink converter. The nest knocked the dish out of alignment, making the signal difficult to receive. The dish needs to be realigned.

SMYRNA SCHOOL DISTRICT

Central Office
22 South Main Street
Smyrna, DE 19977
(302) 653-8585

CONTACT PERSON
August Diemicke

SCHOOL DISTRICT(S)
Smyrna School District

TYPE OF TECHNOLOGY
Satellite

SUPPORT TECHNOLOGIES
VCRs and a fax machine in the central office

YEARS OPERATING IN SCHOOL/DISTRICT(S)
2 years

COURSE(S) BEING TAUGHT
No courses were taught with the satellite. The satellite receives supplemental materials for the science and foreign language courses.

NUMBER OF STUDENTS PER COURSE
Approximately 500-600 students view materials received by the satellite each day.

TEACHER/FACILITATOR TRAINING
Teachers needed no knowledge in operating the equipment.

COST

- **INSTALLATION** - The dish was donated to the school.
- **MAINTENANCE** - Not available

STRENGTHS OF PROGRAM
The system brought a variety of programs to the school and supplemented the foreign language and science offerings.

WEAKNESSES OF PROGRAM
Lack of funds has hindered the repair of the satellite dish. The program has stopped until the equipment can be repaired.

NOTES
The Smyrna School District has been without a satellite for a year due to the dish breaking down. The dish was donated to them used, and the cost to repair the dish has hindered repairs.

UNIVERSITY OF DELAWARE/ST. MARK'S HIGH SCHOOL

University of Delaware
204 John M. Clayton Hall
Newark, DE 19716
(302) 451-6442

St. Mark's High School
Pike Creek Road
Wilmington, DE 19808
(302) 738-3300

CONTACT PERSON

University of Delaware, Mary Pritchard, Focus Program Coordinator, or Dr. Dene Klinzing, (302) 451-8561

St. Mark's High School, Linda Fischer, Technology Director, or Cathy Culnane, teacher

SCHOOL DISTRICT(S)

Catholic Diocese of Wilmington

TYPE OF TECHNOLOGY

VCRs and TV

YEARS OPERATING IN SCHOOL/DISTRICT(S)

Approximately 2 months

COURSE(S) BEING TAUGHT

Child Development

NUMBER OF STUDENTS PER COURSE

12

TEACHER/FACILITATOR TRAINING

No training is necessary since the only technology being used by the St. Mark's staff is VCRs.

COST

- **INSTALLATION** - No cost for program; the school already had VCRs.
- **MAINTENANCE** - Not available

STRENGTHS OF PROGRAM

St. Mark's students can take the class in Child Development and receive three college credits.

NOTES

St. Mark's started this program with the University of Delaware where Dr. Dene Klinzing teaches child development. Her course has been videotaped and the St. Mark's students watch a tape every six days. The class is one college semester but will last one year in order to provide an easier pace for the high school students. Dr. Klinzing plans to visit St. Mark's every five weeks; the St. Mark's students will visit the University of Delaware campus.

WILLIAM PENN HIGH SCHOOL

William Penn High School
713 Basin Road
New Castle, DE 19720
(302) 323-2867

CONTACT PERSON
Judy Upshure, Media Coordinator

SCHOOL DISTRICT(S)
Colonial School District

TYPE OF TECHNOLOGY
Satellite

SUPPORT TECHNOLOGIES
A master receiver for "talking" to the satellite is in the media center with a second receiver in the foreign language department. William Penn High School owns VCRs that can play tapes from Europe. (European video systems have a different number of horizontal lines per frame than American systems, making it impossible for American VCRs to read the information on European videotapes.)

YEARS OPERATING IN SCHOOL/DISTRICT(S)
5 years

COURSE(S) BEING TAUGHT
French; German; Spanish

NUMBER OF STUDENTS PER COURSE
An average of 30 students take each course.

TEACHER/FACILITATOR TRAINING
No training is needed since teachers already know how to use VCRs. Picking-up the satellite transmissions is handled by the media coordinator.

COST

- **INSTALLATION** - $2,000
- **MAINTENANCE** - $150 over the course of three years for minor repairs

STRENGTHS OF PROGRAM
Students watch videotapes with native speakers of the languages they are studying. This approach gives them a better feel for the culture and the language. It also makes news from around the world available to teachers and students.

WEAKNESSES OF PROGRAM
Taping programs sometimes presents scheduling problems. Often one program will replace another at the last moment.

NOTES

The equipment was purchased with funding from a state grant. The media coordinator prepares a weekly list of programs that teachers might want to use. For the school year 1989, the satellite was "down" due to the need for repairs. Repairs occurred in September 1990.

WOODBRIDGE JUNIOR SENIOR HIGH SCHOOL

307 Laws Street
Bridgeville, DE 19933
(302) 337-8289

CONTACT PERSON
Milton Morozowich, Principal

SCHOOL DISTRICT(S)
Woodbridge School District

TYPE OF TECHNOLOGY
Satellite

SUPPORT TECHNOLOGIES
A TV in every homeroom, 1 VCR

YEARS OPERATING IN SCHOOL/DISTRICT(S)
The 1990-91 school year

COURSE(S) BEING TAUGHT
The Channel One broadcast supplements almost every course in the school.

NUMBER OF STUDENTS PER COURSE
725 students watch the Channel One broadcast each day.

TEACHER/FACILITATOR TRAINING
No training was necessary; the people who installed the equipment showed the teachers how to turn on the equipment.

COST

- **INSTALLATION** - No cost to school - Whittle Communications supplied equipment and installation money.
- **MAINTENANCE** - No cost to school - Whittle Communications supplies maintenance.

STRENGTHS OF PROGRAM
The program makes students aware of mass communications and global concerns.

WEAKNESSES OF PROGRAM
Weakness of the program is that teachers and administrators in the school may not use the equipment to its full potential.

NOTES
The TV monitors supplied by Whittle Communications have external jacks. Teachers have hooked their computers and VCRs into their TVs to demonstrate lessons to students.

DESCRIPTIONS OF MARYLAND PROGRAMS

STATE CONTACT(S)

Robert Gunther
Administrator, Special Projects
Maryland Department of Education
Division of Instructional Technology
11767 Owings Mills Boulevard
Owings Mills, MD 21117
(301) 581-4211

ANNE ARUNDEL COUNTY PUBLIC SCHOOLS TWO-WAY CABLE INTERACTIVE PROGRAM

Anne Arundel County Public Schools
188 Green Street
Annapolis, MD 21401
(301) 224-5020

CONTACT PERSON

Dan Higgs, Coordinator Media Technology

SCHOOL DISTRICT(S)

Anne Arundel

TYPE OF TECHNOLOGY

The county uses two-way cable for the program. The television screen can only show one classroom at a time. The phone lines are open to all classrooms at all times; even if the classrooms cannot see each other all the time, they can hear each other.

SUPPORT TECHNOLOGIES

Each classroom is equipped with its own VCR, fax machine, and a projection screen TV.

YEARS OPERATING IN SCHOOL/DISTRICT(S)

8 years

COURSE(S) BEING TAUGHT

There are three cable systems in the county, North, Central, and Southern. Each system connects two or more high schools together via cable.

North System (4 schools): Accounting II, Modern European History, Probability and Statistics, Creative Writing, International Studies, Sports Medicine

Central System (5 schools): Family Life, Latin, Creative Writing, Sociology, Accounting II, AP Modern European History, Current Perspectives in Music

Southern System (3 schools): Accounting II, Creative Writing, Business Communications, American Dream, Study Skills and Notetaking, Management, Integrated Topics in Mathematics

NUMBER OF STUDENTS PER COURSE

Courses vary from six to 26 students with the most common range between 15 17 students per course.

TEACHER/FACILITATOR TRAINING

The school provides the training which consists of two workshops for new teachers and assistants.

COST

- **INSTALLATION** - The initial cost was $25,000 per site; the price has gone down and is now approximately $17,500.
- **MAINTENANCE** - The local cable company shares maintenance cost. The cost also is supported by the local school budget. No cost figures are available.

STRENGTHS OF PROGRAM

The program allows students to take courses that otherwise are unavailable. The decentralized system allows courses to originate from any school depending on where the largest class and/or a master teacher is located. Students meet and work with students from other schools.

WEAKNESSES OF PROGRAM

A weakness of the program occurs when the cable system experiences technical difficulties. Sometimes the signal will stop, thus disrupting the classroom instruction.

NOTES

A pregnant teacher taught her regular class from her bedroom when she could no longer go to the school. Students who are home sick and who have cable do not need to miss class. Three local cable companies -- United Cable of Annapolis, Jones CATV, and North Arundel CATV -- supply lines for connecting the schools. However, the companies are not interconnected; each company supplies one forward and one return channel and maintains its own transmission equipment.

BALTIMORE COUNTY PUBLIC SCHOOLS INTERACTIVE TELEVISION

Baltimore County Public Schools
6901 North Charles Street
Towson, MD 21204
(301) 887-4907

CONTACT PERSON
Mary Hackman

SCHOOL DISTRICT(S)
Baltimore County

TYPE OF TECHNOLOGY
Cable and TV

SUPPORT TECHNOLOGIES
In five of the district's high schools, a classroom is dedicated to interactive intruction. In addition to television cameras and microphones, a fax machine and a VCR provide support. Security systems have been installed.

YEARS OPERATING IN SCHOOL/DISTRICT(S)
3 years

COURSE(S) BEING TAUGHT
Shorthand I, Latin I, French V, Spanish V, and Spanish VI

NUMBER OF STUDENTS PER COURSE
During the first year, only five students enrolled in the program. Now, an average of 10 students register in each receiving class.

TEACHER/FACILITATOR TRAINING
Facilitators receive two days of training with an additional day conducted on the school site.

COST

- **INSTALLATION** - Approximately $20,000 per site for equipment; the price for each classroom depends on modifications for equipment.
- **MAINTENANCE** - Not available

STRENGTHS OF PROGRAM
The ability to offer a larger menu of classes to small high schools is the main strength. Local evaluations have shown that students and teachers would take and teach the courses again.

WEAKNESSES OF PROGRAM
Although the district has its own cable line, it is still necessary to borrow time from the local cable company and the community colleges to have two-way communication between classrooms. The district is "piggybacking" on lines that are not being used by the cable company or the colleges. Evaluations indicate that students and teachers are disturbed by technical difficulties that sometimes occur with the equipment.

NOTES

Using signals picked-up from one school's satellite dish, students study news transmissions from Europe in the foreign language classes.

CARROLL COUNTY PUBLIC SCHOOLS TWO WAY CABLE PROGRAM

Resource Center
Carroll County Public Schools
55 North Court Street
Westminister, MD 21157
(301) 857-5090

CONTACT PERSON
Donnadine Spilman

SCHOOL DISTRICT(S)
Carroll County

TYPE OF TECHNOLOGY
Two-way cable is used by the county in its distance learning program.

SUPPORT TECHNOLOGIES
Each classroom has a VCR, a fax machine, a chalkless board, video camera, and two TV monitors.

YEARS OPERATING IN SCHOOL/DISTRICT(S)
5 years

COURSE(S) BEING TAUGHT
No course is being offered this semester (fall of 1990). The program previously has offered Advanced American History.

NUMBER OF STUDENTS PER COURSE
The numbers vary; the range is from 8 to 25.

TEACHER/FACILITATOR TRAINING
Training consists of one class offered to teachers and to experienced room facilitators.

COST

- **INSTALLATION** - Approximately $22,000 per site
- **MAINTENANCE** - The cost includes $5,000 for each camera operator. Carroll County is upgrading their sound system for $6,500.

STRENGTHS OF PROGRAM
The greatest strength of the program is the ability to offer courses to students who would not otherwise get them.

WEAKNESSES OF PROGRAM
A problem has been recruiting good teachers who want to teach via cable television. Carroll County has experienced technical difficulties, mostly from the sound system, which sometimes disrupts the class. They also depend on the "goodwill" of the cable company for timely repairs, since they receive the use of a cable line via a franchise agreement with no direct charge for use.

MONTGOMERY COUNTY PUBLIC SCHOOLS TWO WAY INSTRUCTIONAL TELEVISION PROJECT

850 Hungerford Drive
Rockville, MD 20850
(301) 279-3493

CONTACT PERSON
Harry Swope

SCHOOL DISTRICT(S)
Montgomery County

TYPE OF TECHNOLOGY
The program uses two-way video and audio. Students can see and hear students at the other sites. Although seven buildings currently are connected in the program, the county is working to connect all 21 high schools.

SUPPORT TECHNOLOGIES
Computer, videodisc player, VCR, and TV cameras for each classroom

YEARS OPERATING IN SCHOOL/DISTRICT(S)
2 years

COURSE(S) BEING TAUGHT
Chinese Language II and Art and Culture

NUMBER OF STUDENTS PER COURSE
15-30

TEACHER/FACILITATOR TRAINING
The county is developing inservice training programs, working with the state department of education and other districts. For this year's training, participants (both teachers and technicians) attended training at another district and also received individualized training activities.

COST

- **INSTALLATION** - $10,000 for interconnecting the cable equipment
- **MAINTENANCE** - $1,500 the first year for repairing equipment

STRENGTHS OF PROGRAM
The program provides students with classes they could not otherwise take. The wider selection of classes solves an equity problem in the smaller schools.

WEAKNESSES OF PROGRAM
The program is limited by budget constraints that preclude purchasing equipment and expanding it to other schools.

NOTES
Benefits of the program are that students become interested in each other in the different locations. The excitement generated by the classes increases morale. Montgomery County partners with the local cable company rather than the county government in operating the program. Planning is under way to construct a private fiber optic network for the public schools.

PRINCE GEORGE'S COUNTY PUBLIC SCHOOLS

Prince George's County Public Schools
8437 Landover Road
Landover, MD 20785
(301) 386-1600

CONTACT PERSON

Scott Schiller, Supervisor of the Office of Television Resources

SCHOOL DISTRICT(S)

Prince George's County

TYPE OF TECHNOLOGY

The county uses 2-way video and computer throughout the six sites. The sites are hooked together using coaxial cable and fiber optics. Sites also use 2-way computers that broadcast simultaneously with the cable. Each classroom can see the other classrooms and the teacher at the same time.

SUPPORT TECHNOLOGIES

Each classroom has a VCR as well as videodiscs to further enhance the lessons.

YEARS OPERATING IN SCHOOL/DISTRICT(S)

1 year

COURSE(S) BEING TAUGHT

AP American Government, AP Comparative Government, AP Modern European History, AP Art History, AP Calculus, AP Spanish IV, AP Spanish V, Speech; mock trials and debates are also offered.

AFTER SCHOOL CLASSES: SAT courses 2 days a week, psychology course taught by the local community college one day a week, staff development for updating teacher skills, Parent Community Outreach Programs, math project for elementary levels offered on Saturdays.

All classes are taught by high school teachers employed by the school system and are not purchased from an outside vendor. No outside teachers were hired. The courses are broadcast from the teacher's classroom to the other sites.

NUMBER OF STUDENTS PER COURSE

35-45 students take each class; this number includes students from all of the sites.

TEACHER/FACILITATOR TRAINING

Teachers receive three full weeks of training on the system and once a month follow-up sessions. Aides receive seven days of training. The aides did not need TV experience but do need computer and class management skills.

COST

- **INSTALLATION** - $22,000-$25,000 per classroom
- **MAINTENANCE** - $15,000 per classsroom; covers cost of equipment and an aide's salary

STRENGTHS OF PROGRAM

To their knowledge, Prince George's County is the only public school system to use 2-way video and computers. Interaction between the teacher and students is high, with almost every student participating every day.

WEAKNESSES OF PROGRAM

The major difficulty experienced in this program is fitting together the class schedules of six schools and a college.

NOTES

Prince George's County has a videotape explaining the program.

WASHINGTON COUNTY PUBLIC SCHOOLS TWO WAY CABLE & MICROWAVE PROGRAM

Washington County Board of Education
823 Commonwealth Avenue
Hagerstown, MD 21740
(301) 791-4208

CONTACT PERSON
Vince Tantillo

SCHOOL DISTRICT(S)
Washington County

TYPE OF TECHNOLOGY
Two-way cable and two-way microwave, both with two-way audio and video capacity. (The microwave sites have towers and dishes.)

SUPPORT TECHNOLOGIES
VCRs, fax machines, and telephones are installed in every classroom.

YEARS OPERATING IN SCHOOL/DISTRICT(S)
1 year

COURSE(S) BEING TAUGHT
Calculus, Accounting II, AP European History, Accounting I, Shorthand I, Business Law

NUMBER OF STUDENTS PER COURSE
215 students per day are involved in distance learning courses.

TEACHER/FACILITATOR TRAINING
Teachers and facilitators have attended half-day workshops over a two week period.

COST

- **INSTALLATION** - $100,000 for the two microwave sites; $10,000 total for connecting the cable schools
- **MAINTENANCE** - Not available

STRENGTHS OF PROGRAM
The program provides courses to students who could not take them otherwise.

NOTES
The microwaves are used to broadcast over a mountainous area. The local cable company helps Washington county operate their system.

DESCRIPTIONS OF NEW JERSEY PROGRAMS

STATE CONTACT(S):

Dr. Carol Scelza, Manager
New Jersey Department of Education
CN 500
Trenton, NJ 08625-0500
(609) 984-1805

Dr. Ted Smorodin, Education Specialist
New Jersey Department of Education
CN 500
Trenton, NJ 08625-0500
(609) 984-1805

ACCESS NJIT

ACCESS NJIT
University Heights
Newark, NJ 07102
(201) 596-3178

CONTACT PERSON

Ann Lippel, Director
When registering for classes, call the Center for Distance Learning, (201) 596-3177.

SCHOOL DISTRICT(S)

Statewide

TYPE OF TECHNOLOGY

ACCESS NJIT classes can be received through the following three types of delivery systems: Instructional Television Fixed Services (ITFS), Cable Television Network (CTN), and VHS tape circulation. The delivery system used to receive the NJIT transmissions is chosen by each site according to the geographical factors in their region.

SUPPORT TECHNOLOGIES

Students are encouraged to FAX materials using fax machines in the administration offices of their schools. School facilitators are encouraged to use the Electronic Information Exchange System [EIES] and the NJIT computerized conferencing network for communication.

YEARS OPERATING IN SCHOOL/DISTRICT(S)

2 years

COURSE(S) BEING TAUGHT

Students can obtain college credit from these courses: Introduction to Calculus A (Math 108), Introduction to Calculus B (Math 109), Computer Programming Using BASIC, Introduction to Calculus I (Math 111), Calculus II (Math 112), Introduction to Physics 1 - Mechanics (PHYS 111), Introduction to Computer Programming and Problem Solving (CIS 101), Introduction to Computer

Science (CIS 113/213), Principles of Operating Systems (CIS 332), Introduction to Business (OS 171), Management amd Supervision (Mgmt 390)

NUMBER OF STUDENTS PER COURSE

An average of 6 students per site

TEACHER/FACILITATOR TRAINING

Although the site facilitator does not have to be certified in the course discipline, his or her knowledge in the subject area being taught obviously benefits the students.

COST

- **INSTALLATION** - A school wishing to receive ACCESS NJIT's programs can choose from three different delivery systems. If a school chooses video tape rental, it must pay $5 per tape and the school must supply a VCR and TV. If a school is using ITFS, it must install an antenna and converter, costing under $1,000, to receive the signal. If the course is offered on CTN and the school is in a CTN receiving area, the school can receive the class through cable TV.
- **MAINTENANCE** - Not available

STRENGTHS OF PROGRAM

Students receive college credit for the classes. The distance learning technology allows students to take classes they would not be able to take otherwise.

WEAKNESSES OF PROGRAM

Both the schools and NJIT desire greater interaction between the teacher and students.

NOTES

NJIT receives programs from Arts and Sciences Teleconferencing Service (ASTS) at Oklahoma State University and the Midlands Consortium located in Stillwater, Oklahoma.

NEW JERSEY (SERC) PROJECT

New Jersey Network
1573 Parkside Avenue
CN777
Trenton, NJ 08625-0777
(609) 530-5252

CONTACT PERSON

Walter Freas, Director of Educational Services

SCHOOL DISTRICT(S)

Asbury Park High School
Sunset Avenue
Asbury Park, NJ 07712

Bergen County
Special Services School District
Bleshman School
333 E. Ridgewood Ave.
Paramus, NJ 07652

Bergen County Voc/Tech Schools
200 Hackensack Avenue
Hackensack, NJ 07601

Bloomfield High School
160 Broad Street
Bloomfield, NJ 07003

Boonton High School
306 Lathrop Avenue
Boonton, NJ 07005

Cedar Grove High School
South End School
Harper Terrace
Cedar Grove, NJ 07009

Dover High School
Grace Street
Dover, NJ 07801

Eastern Camden County High School
P.O. Box 250, Laurel Oak Road
Voorhees, NJ 08034

Glassboro High School
Annex A-N. Delsea Drive
Glassboro, NJ 08028

Kittatinny Regional High School
R.D. 10, Box 10255
Halsey Myrtle-Grove Road
Newton, NJ 07860

Lakeland Regional High School
205 Conklintown Road
Wanaque, NJ 07465

Lakewood High School
East Seventh Street
Lakewood, NJ 08701

Lawrence Township High School
2565 Princeton Pike
Lawrenceville, NJ 08648

Lenape Regional High School District
235 Hartford Road
Medford, NJ 08055

Mainland Regional High School
1301 Oak Avenue
Linwood, NJ 08221

Manchester Township High School
101 South Colonial Drive
Lakehurst, NJ 08733

Moorestown Township Public Schools
Bridgeboro Road
Moorestown, NJ 08016

Morris Hills High School
520 West Main Street
Rockaway, NJ 07866 3799

Hammonton High School
North Liberty Street
Hammonton, NJ 08037

Hillsborough High School
Raider Boulevard
Belle Mead, NJ 08502

Holmdel High School
P.O. Box 407
Holmdel, NJ 07733-0407

Irvington Public Schools
1324 Springfield Avenue
Irvington, NJ 07111

Ocean Township High School
550 West Park Avenue
Oakhurst, NJ 07755

Pemberton High School
c/o Channel 14, Arney's Mount Road
Pemberton, NJ 08068

Pennsauken High School
Hylton Road
Pennsauken, NJ 08110

Penns Grove High School
Harding Highway
Carney's Point, NJ 08069

Pequannock Township High School
85 Sunset Road
Pompton Plains, NJ 07444

Perth Amboy High School
Eagle Avenue & Francis Street
Perth Amboy, NJ 08861

Point Pleasant Borough High School
Laura Herbert Drive
Point Pleasant, NJ 08742

Woodrow Wilson High School
3100 Federal Street
Camden, NJ 08105

Morristown High School
50 Early Street
Morristown, NJ 07960

Mountain Lakes High School
Powerville Road
Mountain Lakes, NJ 07046

Neptune High School
55 Neptune Boulevard
Neptune, NJ 07753

North Plainfield Public Schools
34 Wilson Avenue
North Plainfield, NJ 07060

Red Bank Regional High School
101 Ridge Road
Little Silver, NJ 07739

Roxbury High School
1 Bryant Drive
Succasunna, NJ 07876

Sterling High School
Somerdale, NJ 08083

Trenton Central High School
Chambers Street
Trenton, NJ 08609

Vernon Township Public Schools
P.O. Box 800
Vernon, NJ 07462

Wayne Hills/Wayne Valley High School
272 Berdan Avenue
Wayne, NJ 07470

Watchung Hills Regional High School
108 Stirling Road
Warren, NJ 07060

TYPE OF TECHNOLOGY

Satellite

SUPPORT TECHNOLOGIES

NJN also is hooked into Learning Link, a computer on-line service.

YEARS OPERATING IN SCHOOL/DISTRICT(S)
2 years

COURSE(S) BEING TAUGHT
Japanese I, Probability and Statistics, Russian I, Advanced Placement Economics, Macroeconomics, Advanced Placement Economics, Microeconomics, Discrete Mathematics, Physics, and World Geography

NUMBER OF STUDENTS PER COURSE
The New Jersey Department of Education generally allows no more than six students per class.

TEACHER/FACILITATOR TRAINING
Specific teleconferences are provided by each producer of the individual courses to prepare classroom teachers. The teachers also receive a facilitator's manual from the producers.

COST
- **INSTALLATION** - Initially $300,000 was generated to buy equipment.
- **MAINTENANCE** - Not available; SERC is working on giving individual schools a maintenance contract.

STRENGTHS OF PROGRAM
The program offers courses that were otherwise unavailable. Students also can take courses offered by universities; teachers can attend in-service education workshops. Teachers also use the technology for teleconferencing.

WEAKNESSES OF PROGRAM
The demand for the service is greater than NJN can currently provide.

NOTES
The New Jersey Network (NJN) and New Jersey State Department of Education joined forces and became members of SERC. Through SERC, New Jersey received two grants totalling $280,000. The New Jersey schools matched this money to buy distance learning equipment.

Along with the classes, SERC, in collaboration with ASTS, also offers students the Precollege Guidance Information Series. This series involves three modules preparing students (and their parents) for the college experience. The first module, PSAT/NMSQT Preparation By Satellite, prepares high school sophomores and juniors for taking the PSAT/NMSQT. The second module targets students and their parents involved in selecting and paying for a college. The third module targets middle school students and parents, providing an early awareness of how to plan for college. SERC is offering Science, Technology, and Society Seminars for interested students. Each is a 50-minute session; a total of sixteen seminars will be offered. SERC also offers teachers the Teacher Inservice teleconferences produced by Kentucky Educational Television, Louisiana Public Broadcasting, Wisconsin SERC, NJN, and the New Jersey State Department of Education.

DESCRIPTIONS OF PENNSYLVANIA PROGRAMS

STATE CONTACT(S):

Dr. Doris Epler, Director
School Library Media Services
Pennsylvania Department of Education
333 Market Street
Harrisburg, PA 17126-0333
(717) 787-6704

Blaze Gusic
School Library Media Services Division
Pennsylvania Department of Education
333 Market Street
11th Floor
Harrisburg, PA 17126-0333
(717) 787-6704

Dr. Joseph Skok
Division of Educational Planning
Pennsylvania Department of Education
333 Market Street
Harrisburg, PA 17126-0333
(717) 783-2862

ALTOONA AREA SCHOOL DISTRICT

Altoona Area School District
5th Avenue & 15th Street
Altoona, PA 16602
(814) 946-8211
FAX: (814) 946 8375

CONTACT PERSON

Dr. Fred Smeigh

SCHOOL DISTRICT(S)

Altoona Area

TYPE OF TECHNOLOGY

Satellite and Cable TV

SUPPORT TECHNOLOGIES

Each classroom has a TV monitor. The district is hoping to place VCRs in every classroom. Teachers also have access to videodisc players and VCRs.

YEARS OPERATING IN SCHOOL/DISTRICT(S)

The satellites have been in operation since the beginning of the 1990-1991 school year. The cable TV has been in operation for twenty years.

COURSE(S) BEING TAUGHT

Staff development is being offered through the satellite dishes. Students can take college level courses through PennRama at the Pennsylvania State University and the Bloomsburg Intermediate Unit.

NUMBER OF STUDENTS PER COURSE

Staff development is available to over 520 teachers. Presently 10 students take courses through PennRama. The program will be expanded to 30 students next year. The LEAD Teacher Center in Altoona also uses the technology for staff development.

TEACHER/FACILITATOR TRAINING

Currently there is no need to train teachers or facilitators in the video technology.

COST

- **INSTALLATION** - Satellite dishes cost $4,500 each; the television cable lines were already available.
- **MAINTENANCE** - There is currently no maintenance cost for the satellite dishes; the TV studio costs an estimated $10,000 a year to maintain.

STRENGTHS OF PROGRAM

Altoona's technology offers unlimited opportunities for both students and teachers. Programs range from staff development to college credit courses.

WEAKNESSES OF PROGRAM

The phone lines for students to ask questions often are busy. Students do not have the opportunity to interact with the teacher during class time. Often reception from the satellite is poor.

NOTES

Altoona Area spent $250,000 for a new television station that will offer television classes and be operated by students. Using local cable, students also can take correspondence courses through the Pennsylvania Educational Channel. Plans for 1991-92 are to offer by satellite Advanced Placement Economics and either Russian or Japanese. Altoona Area also has a multi media lab that can send four channels of audio and/or video to each station. The lab has its own satellite dish and can send programs by satellite, cable, VCR, or laser disk. Used mainly by foreign language classes and the library in high schools, the lab has forty-two stations but is expandable to 100. Altoona Area also has a video theater with a large screen projection TV that seats 100. The TV receives signals from the satellite dish, cable, VCR, or laser disk. The theater is located in Altoona Area High School.

AUSTIN SCHOOL DISTRICT

Austin Area School District
Box 7
Austin, PA 16720
(814) 647-8603
FAX: (814) 647-6669

CONTACT PERSON
Charylene Philp, Superintendent

SCHOOL DISTRICT(S)
Austin Area School District

TYPE OF TECHNOLOGY
Satellite and audiographics

SUPPORT TECHNOLOGIES
VCRs, extra TV monitors, and computers

YEARS OPERATING IN SCHOOL/DISTRICT(S)
Started in the 1990-91 school year.

COURSE(S) BEING TAUGHT
French I is being taught through TI-IN, a satellite distance learning program. Spanish I and II is being taught with the use of audiographics; the teacher is in the Sutherland School District, Nebraska.

NUMBER OF STUDENTS PER COURSE
8 students take Spanish I; 16 students take Spanish II; and 3 students take French.

TEACHER/FACILITATOR TRAINING
Both TI-IN and the Sutherland School District provide training for teachers in operating the equipment. Glen Fox, from the Sutherland School District in Nebraska, explained to the Austin Area teachers the process of connecting and operating the audiographic equipment over the phone.

COST
- **INSTALLATION** - $7,000
- **MAINTENANCE** - No cost information is available currently.

STRENGTHS OF PROGRAM
The program provides students with the opportunity to receive otherwise unavailable classes and a new opportunity for students to make friends through the technology. It also forces students to take responsibility for their own education.

WEAKNESSES OF PROGRAM
The students do not interact with the teacher (face-to-face) when using audiographics.

NOTES

The Austin Area School District is unique in the region because it uses two types of distance learning technologies, satellite and audiographics, for delivering two separate courses. A satellite is used for teaching French I, a course given by TI-IN. The audiographics are used for teaching Spanish I and II from Nebraska. AT&T has loaned Austin Area School District the audiographic equipment for the fall semester. Both AT&T and Superintendent Philp are working to find resources for the district to purchase the equipment in the future.

THE PENNSYLVANIA TELETEACHING PROJECT

R.D. #2
Green Crest Drive
Shippenville, PA 16254
1-(800)-672-7123

CONTACT PERSON

Dorothy L. Hajdu

SCHOOL DISTRICT(S)

The following is a list of past and present participants:

Bald Eagle Nittany High School
Mill Hall, PA 17751

Benton High School
Benton, PA 17814

Bucktail Area High School
Renovo, PA 17764

Central Fulton School District
McConnellsburg, PA 17233

Corry Area High School
Corry, PA 16407

Danville Area High School
Danville, PA 17821

Franklin Area School District
Franklin, PA 16323

Fulton County Area Voc/Tech School
Waterfall, PA 16689

Iroquois High School
Erie, PA 16511

Keystone Central School District
Lock Haven, PA 17745

Liberty High School
Liberty, PA 16930

Loysville Youth Develop Center
Loysville, PA 17047

Mansfield High School
Mansfield, PA 16933

Mapletown High School
Greensboro, PA 15338

Benton Elementary
Benton, PA 17814

Bethlehem Center High School
Fredericktown, PA 15333

Central Columbia Middle School
Bloomsburg, PA 17815

Columbia Montour Alternative School
Berwick, PA 18602

Cranberry High School
Seneca, PA 16346

Forbes Road School District
Harrisonville, PA 17228

Fulton County Area Voc/Tech School
McConnellsburg, PA 17233

Fulton County Area Voc/Tech School
Warfordburg, PA 17267

Karns City School District
Karns City, PA 16041

Lenape Elementary School
Ford City, PA 16226

Loyalsock Township School District
Williamsport, PA 17701

Mahoning Cooper Elementary
Danville, PA 17821

Mansfield University
Mansfield, PA

McConnellsburg High School
McConnellsburg, PA 17233

Mon Valley Education Consortium
McKeesport, PA 15132

Moniteau High School
West Sunbury, PA 16261

North Central Secure Treatment Center
Danville, PA 17821

North East School District
North East, PA 16428

North Penn High School
Reading, PA 19601-3691

Reading School District
Reading, PA 19601-3691

Redbank Valley School District
New Bethlehem, PA 16242

Saint Joseph School
Danville, PA 17821

Sheffield Area High School
Sheffield, PA 16347

Southern Fulton School District
Warfordsburg, PA 17267

Southern Tioga School District
Mansfield, PA 16933

Tidioute High School
Tidioute, PA 16351

Towanda School District
Towanda, PA

Troy High School
Troy, PA 16947

Unionville High School
Unionville, PA 19375

Venango Christian High School
Oil City, PA 16301

Warren Area High School
Warren, PA 16365

Wasatch County School District
Heber City, Utah 84032

West Hills Elementary
Kittanning, PA 16201

TYPE OF TECHNOLOGY

The project uses an audiographics system which connects classrooms through the use of conventional telephone lines. Lectures and students' responses are facilitated with speaker phones, while visuals are incorporated into computer graphic presentations. Lessons may include teacher generated slides, scanned images, simultaneous computer courseware, and video disc applications.

SUPPORT TECHNOLOGIES

Videodisc players, large screens, image scanners, and video-imaging (capable of transmitting video images in a form the computer can understand)

YEARS OPERATING IN SCHOOL/DISTRICT(S)

6 years

COURSE(S) BEING TAUGHT

Science, French, Spanish, Pascal, Calculus

NUMBER OF STUDENTS PER COURSE

20-30 students per course

TEACHER/FACILITATOR TRAINING

A one-day inservice training is provided in which teachers are given "hands on" experience with the technology and its capabilities. An on-line training and toll-free technical assistance line also is available.

COST

- **INSTALLATION** - Approximately $5,000 per site, including software
- **MAINTENANCE** - Not available

STRENGTHS OF PROGRAM

The program fulfills a need by giving students otherwise unavailable classes. It also is practical since schools share resources and costs.

WEAKNESSES OF PROGRAM

There is always difficulty in scheduling class times; also, the program has had a difficult time making educators aware of its existence and capabilities.

NOTES

The Pennsylvania Teleteaching Project uses IBM compatible equipment. Although some is supplied by the project, most is supplied by the participant.

SATELLITE EDUCATIONAL RESOURCES CONSORTIUM (SERC) PENNSYLVANIA

School Library Media Services Division
Pennsylvania Department of Education
333 Market Street
11th Floor
Harrisburg, PA 17126-0333
(717) 783-5420
FAX: (717) 783-5420

CONTACT PERSON
Blaze Gusic

SCHOOL DISTRICT(S)
67 schools statewide

TYPE OF TECHNOLOGY
Satellite

SUPPORT TECHNOLOGIES
VCRs and TVs

YEARS OPERATING IN SCHOOL/DISTRICT(S)
2 years

COURSE(S) BEING TAUGHT
Courses include math, science, foreign language, economics, staff development, and student seminars.

NUMBER OF STUDENTS PER COURSE
300 students

TEACHER/FACILITATOR TRAINING
Teleconferences are offered to train facilitators and students. The facilitators and students interact with the program presenter telephone system and/or a computer-driven keypad system.

COST

- **INSTALLATION** - Cost is $7,324 for satellite, VCR, and TV monitor; money was spread throughout the state so that part of selected schools' costs could be covered.
- **MAINTENANCE** - The company that installed the satellites charges $100 per year for maintenance.

STRENGTHS OF PROGRAM
The system provides educational programs to students and teachers who cannot otherwise get them. Underprivileged students may be better prepared for college and may not have to take preparatory classes in college.

WEAKNESSES OF PROGRAM
Enrollment size of each class needs to be larger.

WHITTLE COMMUNICATIONS

Sharon Chan
c/o Whittle Communications
505 Market St.
Knoxville, TN 37902
1-(800)-253-1330

CONTACT PERSON

Sharon Chan

SCHOOL DISTRICT(S)

Archdiocese-Philadelphia Schools
222 North 17th Street
Philadelphia, PA 19103

Berwick Area School District
500 Market Street
Berwick, PA 18603

Bradford Area School District
50 Congress Street
Bradford, PA 16701

Bristol Township School District
800 Coates Avenue
Bristol, PA 19007

Brockway Area School District
95 North Street
Brockway, PA 15824

Chester Upland School District
18th & Melrose Avenue
Chester, PA 19013

Chestnut Ridge High School
R.D. #1
New Paris, PA 15554

Clarion Limestone School District
Road 1, Box 205
Strattanville, PA 16258

Coatesville Area School District
1515 East Lincoln Highway
Coatesville, PA 19320

Columbia Borough School District
901 Ironville Pike
Columbia, PA 17512

Columbia Montour Voc/Tech District
Road 5
Bloomsburg, PA 17815

Corry Area School District
800 East South Street
Corry, PA 16407

Danville Area School District
Pine & East Mahoning Street
Danville, PA 17821

Dioc-Allentown Schools
Dewberry & Madison Avenue
Bethlehem, PA 18017

Dioc-Erie Schools
517 East 26th Street
Erie, PA 16504

Danville Area School District
Pine & East Mahoning Street
Danville, PA 17821

Dover Area School District
School Lane
Dover, PA 17315

Du Bois Area School District
500 Liberty Boulevard
Du Bois, PA 15801

Greater Johnstown School District
220 Messenger Street
15801 Johnstown, PA 15902

Homer Center School District
Main Street Extension
Homer City, PA 15748

Huntingdon Area School District
723 Portland Avenue
Huntingdon, PA 16652

Karns City Area School District
Road 2, Box 135
Karns City, PA 16041

Line Mountain School District
Rural Delivery 2, Box 320
Herndon, PA 17830

Montrose Area School District
Rural Delivery 3, Box 28
Montrose, PA 18801

Mount Union Area School District
28 West Market Street
Mount Union, PA 17066

Nazareth Area School District
8 Center Square
Nazareth, PA 18064

Northern Cambria School District
600 Joseph Street
Barnesboro, PA 15714

Port Allegany School District
200 Oak Street
Port Allegany, PA 16743

Redbank Valley School District
920 Broad Street
New Bethlehem, PA 16242

Smethport Area School District
414 South Mechanic Street
Smethport, PA 16749

Tyrone Area School District
1317 Lincoln Avenue
Tyrone, PA 16686

United School District
R.R. 56
Armagh, PA 15920

West Branch Area School District
Old Route 153
Morrisdale, PA 16858

Johnsonburg Area School District
Elk Avenue
Johnsonburg, PA 15845

Keystone School District
Petrolia Street
Karns City, PA 16041

Montoursville Area School District
1304 Weaver Street
Montoursville, PA 17754

Moshannon Valley School District
Route 1, Box 314
Houtzdale, PA 16651

Moniteau School District
Box 2035
Mount Union, PA 17066

North East School District
East Division Street
North East, PA 16428

Oil City Area School District
202 Crawford Street
Oil City, PA 16301

Reading School District
800 Washington Street
Reading, PA 19601

Shikellamy School District
6th & Walnut Street
Sunbury, PA 17801

South Butler County School District
Knock Road
Saxonburg, PA 16056

Union City Area School District
91 Miles Street
Union City, PA 16438

Upper Adams School District
North Main Street
Biglerville, PA 17307

West Side Area Voc/Tech
75 Evans Street
Wilkes Barre, PA 18704

Wilkes Barre Area Voc/Tech School
Juniper Road, Plains Township
Wilkes Barre, PA 18705

TYPE OF TECHNOLOGY
Satellite

SUPPORT TECHNOLOGIES
Two VCRs and one TV per 23 students in each school

YEARS OPERATING IN SCHOOL/DISTRICT(S)
1 1/2 years

COURSE(S) BEING TAUGHT
Whittle has three types of channels or three types of programming choices: Channel 1, Educator's Channel, and Classroom Channel. Channel 1 broadcasts 12 minutes of news every day. The Educator's Channel provides staff development. The Classroom Channel is administered by Pacific Mountain Network, which selects programming from a variety of sources. The programs on the Classroom Channel are short, supplemental programs.

NUMBER OF STUDENTS PER COURSE
The student body of a school watch Channel 1. The rest of the programming varies depending on the school.

TEACHER/FACILITATOR TRAINING
A person in each school is trained in operating the satellite dish. The training takes 1 to 2 days.

COST
- **INSTALLATION** - No cost to the schools; Whittle Communications provides and installs equipment.
- **MAINTENANCE** - No cost to the schools; Whittle Communications provides maintenance.

STRENGTHS OF PROGRAM
Students are exposed to information and programming they would otherwise not see.

APPENDIX A

DISTANCE LEARNING MATRIX

FEATURES	SATELLITE	CABLE TV	AUDIOGRAPHICS	INSTRUCTIONAL TELEVSION FIXED SERVICE (ITFS)
INSTALLATION COSTS	Price range- $2,000 - $6,000 Average price - $3,300	Price range- $10,000 - $25,000 Average price- $20,000	Average Price- $5,000	Price Range- $1,000- $100,000 Average Price- $50,500
MAINTENANCE COSTS	Price range- $100 - $150 Average price - $116 (In some cases the cost was not known.)	Price range- $1,500 - $5,000 Average price- $1,625 (In some cases the cost was not known.)	No Cost Available	No Cost Available
STRENGTHS	A satellite dish can receive signals from all over the world. Students can see, hear, and interact with teachers.	Cable TV provides a wider curriculum. Students can see, hear, and interact with the teacher, and sometimes other classrooms.	Audiographics gives students an opportunity to take otherwise unavailable courses. Students can hear and interact with teachers over phone lines.	ITFS provides courses students would otherwise be unable to take. Students can see, hear, and interact with teachers.
WEAKNESSES	A satellite dish can be put out of service by a bird's nest causing the dish to realign or by a storm knocking the dish down. When the dish realigns, the signal often is lost.	Technical difficulties are experienced with cable TV when the signal is stopped or disrupted. Schools using cable company lines may have to stop a class while waiting for cable company to fix down lines. Scheduling classes to fit the schedules of several schools can be difficult, especially if the cable line is borrowed from the cable company and the school's schedules must fit the cable company's schedules.	Students do not see the teacher and do not interact with the teacher face-to-face.	The average signal area is 20 miles unless the signal is carried by boosters or the height of the microwave tower is increased.
COURSE OFFERINGS	French, German, Spanish, Chinese, Staff Development, News Broadcasts, Biology, Physics, Earth Science, Space, History, Art, Calculus, Speech, Accounting, Shorthand, Business Law, Economics, Teleconference- Hazardous Materials, Drugs & Alcohol Awareness	Accounting, History, Probability & Statistics, Creative Writing, International Studies, Sports Medicine, Family Life, Latin, Sociology, Music, Business Communications, Study Skills, American Dream, Management, Integrated Topics in Mathematics, Shorthand, French, Spanish, Chinese, Art & Culture, Government, Calculus, and Speech Courses. Also offered- Mock Trials & Debates, SAT Study Courses	Science, French, Spanish, Pascal, Calculus	Calculus, Accounting, History, Shorthand, Business Law, Computer Programming, Physics, Computer Science, Principles of Operating Systems, Introduction to Business, Management & Supervision

APPENDIX B

TYPES OF TECHNOLOGY

TYPES OF TECHNOLOGY

Instructional Television Fixed Service (ITFS): A band of microwave frequencies set aside by FCC exclusively for the transmission of educational programming. Allows broadcast of audio, video, and data to receive sites located within 20 miles. Receiving sites require a converter that changes signals to those used by a standard television set.

Satellite: A satellite relays signals from Earth. Signals come from a transmitting or sending site to a receiving site. They transmit audio, data, and video programming in a point-to-multipoint configuration. Signals can be sent from all around the world.

Cable: A cable system uses coaxial and fiber optic cable to send signals. A local broadcasting station can pick-up signals from microwave and satellite and retransmit the signal through the cable network.

Computer: Computers can be hooked together through the use of modems and public telephone networks. Computers can be linked to remote data bases and provide bulletin board services for teachers and students to leave messages and search for information. The use of audiographics allows teachers and students to talk to each other via a second phone line as well as to share work through the use of the computer.

APPENDIX C

GLOSSARY

Access: The ability to communicate by using telephones lines. For example, a telephone user is "accessing" the telephone network any time he or she makes or receives a call.

Access Charges: A pricing system developed by the Federal Communications Commission to compensate for the loss of long distance subsidies, which have kept local service rates artifically. Access charges are paid by all local telephone customers and long distance companies.

Amplifier: An electronic component that boosts the strength or amplitude of a transmitted, usually analog, signal; functionally equivalent to a repeater in digital transmission.

Analog: A method of transmission in which information is sent over a medium, such as copper cable or microwave, by changing voltage of signals. Analog transmission has been used for several decades in the telephone industry and is now gradually being replaced by digital transmission.

Asynchronous Transmission: Transmission in which time intervals between transmitted characters may be of unequal length; transmission is controlled by start and stop elements at the beginning and end of each character. Also called start-stop transmission.

Audio Bridges: Electronic devices that control and connect multiple telephone lines for audio and data applications, allowing many callers to be connected simultaneously. Used for audioconferencing.

Audioconferencing: An electronic meeting in which participants in different locations use telephones to communicate simultaneously with each other.

Automatic Route Selection (ARS): A customer-controlled feature allowing a customer to specify automatic routing of calls over the most economical long distance route.

Bandwidth: The range of frequencies assigned to a channel or system; the difference expressed in hertz between the highest and lowest frequencies. For example, the voice frequency range is between 300 and 3300 hertz.

Base Rate Area: Territory determined by the telephone company within an exchange service area, where urban grades of service are furnished at rates that do not vary with the distance from the normal serving central office.

Baud: A unit of signaling that can be defined in two ways: (a) the number of signal elements are of equal length and represent one or more information bits, (b) the reciprocal of the time duration of the shortest signal element being transmitted; e.g., if the shortest signal elements is .02 seconds, the signalling speed would be 50 baud.

Binary Digit (Bit): The smallest unit of information (0 or 1) in the binary system of notation.

Busy Hour: The peak 60 minute period during a business day when the largest volume of communications traffic is handled.

Bypass: The development of private telephone networks by high-volume telephone users to transmit voice and data from one point to another without using the network of the local telephone company.

Central Office: A facility where calls are "switched" or processed within a local exchange or connected to an interexchange carrier. A central office provides "dial tone" to local telephone users.

Centrex: A business communications system providing sophisticated system and station usage features. Uses switching equipment located in telephone company central offices.

Common Carrier: In data communications, a public utility company that is recognized by an appropriate regulatory agency as having a vested interest and responsibility in furnishing communications services to the general public.

Communications Satellite: An earth satellite designed to act as a telecommunications radio relay. Most communications satellites are in geosynchronous orbit 22.300 miles above the equator so that they appear from the earth to be stationary in space.

Computer Conferencing: Allows individuals at different locations to communicate directly with each other through computers. Communication may be in real time or delayed.

Conditioning: The addition of equipment to leased voice grade lines to provide specified minimum values of line characteristics required for improved data transmission, e.g., equalization and echo suppression.

Connecting Arrangement: Denotes the equipment required to accomplish the direct electrical connection of customer-provided facilities with the facilities of the telelphone company.

Continuous Property: The continuous plot of ground including any buildings theron, occupied by a customer, which is not separated by public highways or property occupied by others. Where a customer owns or leases properties on both sides of a street, alley, highway, body of water, railroad right of way, etc., which properties otherwise would be continuous such properties are considered continuous property provided poles or conduits are not required for the placing of wire facilities between the properties, or if required, are furnished and maintained by or at the expense of the subscriber. Within a building, refers to a room of suite of adjacent rooms occupied by the customer.

Coaxial Cable: A special cable designed to carry several channels of telephone and TV signals simultaneously. Use of this cable maintains privacy of the system.

CPE: Customer Provided Equipment - Applies to equipment owned by the customer or leased from vendors other than the telephone company.

CPU: Central Processing Unit - A unit of a computer that includes circuits controlling the interpretation and execution of instructions. Synonymous with central processor, mainframe.

Cross Talk: Unwanted transfer of energy from one circuit, called the disturbing circuit, to another circuit, called the disturbed circuit.

CRT: Cathode Ray Tube - An electronic vacuum tube, such as a television picture tube, that can be used to display graphic images.

Customer-Owned Equipment: Telephones or data equipment -- terminal equipment owned by the customer rather than leased. This equipment can include residential telephones, PABX's or specialized equipment such as computer modems connected to telephone lines.

Data Communications: The interchange of data messages from one point to another over communications channels.

Demarcation Point: Usually refers to the point of meet between the common carrier and the customer's business equipment.

Deregulation: The opening of an industry to competition by legislative or regulatory action. In the telephone industry, deregulation has removed subsidies from certain services, resulting in a move toward cost-based pricing. Deregulation also has separated the telephone industry into several competitive areas, including equipment manufacturing and sales, long distance service and specialized transmission services.

Digital: A method of transmission in which voice signals are converted to computer "bits" of information. Digital technology allows the simultaneous transmission of voice and data over the same line.

Direct Inward Dialing (DID): A feature of PBX and Centex which allows callers from outside the system to reach stations inside the system directly, without intervention by the system's switchboard attendant.

Division of Revenues: An accounting process by which a local telephone company and a long distance company, traditionally AT&T, shared the revenues from long distance calls made over their respective networks. The long distance revenues had been used to subsidize the cost of local service.

DOS: Disk Operating System - A disk-resident programming system that provides operating system capabilities for 16k and larger System/360 and System/370 computing systems.

Downlink: An antenna shaped like a dish that receives signals from a satellite. Often referred to as a dish or earth station.

E-Mail: Electronic Mail - Creation, distribution, storage of documents via computer interface which eliminates the need for paper communications and manual delivery.

EAS: Extended Area Service - A telephone exchange service, without toll charges, that extends over an area where there is a community of interest in return for a somewhat higher exchange service rate.

EAX: Electronic Automatic Exchange - The GTE term for electronic telephone exchange equipment.

EDP: Electronic Data Processing - Data processing largely performed by electronic devices.

Equal Access: The provision by local telephone companies of network facilities that are equal in quality, type and price to all long distance companies (interexchange carriers). Equal Access also means customers will be able to use the long distance company of their choice for "one-plus" dialing. They also may use most other long distance companies by dialing their five-digit access codes.

Exchange: A local geographic area serviced by one or more telephone companies' central offices or switching centers.

Facsimile (FAX): Transmission of pictures, maps, diagrams, or other printed material, usually on the dial-up voice network. The image is scanned by a device at the originating point and reconstructed on paper at the receiving station.

FCC: Federal Communications Commission - Board of Commissioners appointed by the President under the Communications Act of 1934 with the authority to regulate all interstate telecommunications originating in the United States.

Fiber Optics: A transmission technology in which voice and data signals are beamed by laser light through hair-thin strands of glass fibers. Fiber optic cables are much smaller than copper wire cables and have no electrical interference.

Flat-Rate Service: Local service for which customers pay a regular monthly charge for unlimited calls within a local area. Before deregulation of the telephone industry, this service was heavily subsidized by long distance revenues.

Foreign Exchange (FX): A service by which a telephone or PBX in one city, instead of being connected directly to a Central Office in that city, is directly connected to a CO in a distant city via a private line. To callers, this gives the appearance of the telephone or PBX being actually located in the distant city. For example, the general public in the distant city can reach that phone by dialing only given digits as they would for any local number. Conversely, the customer can dial any 7-digit public number in the distant city directly from his or her phone or PBX without paying a toll.

Four-Wire Circuit: Four-wire circuit is a two-way circuit using two paths so arranged that communication currents are transmitted in one direction only on one path and in the other direction on the other path. The transmission paths may or may not employ four wires.

Full Duplex: Telegraph or signaling circuits arranged for transmission in both directions at the same time.

Half Duplex: Transmission in one direction at a time over a single channel. Thus, in a half telegraph system, information can be transmitted in only one direction at a time.

Hardware: Physical equipment as opposed to a computer program or "software," e.g., mechanical, electrical, magnetic or electronic devices.

Hertz (Hz): A unit of frequency equal to one cycle per second. Cycles are referred to as hertz in honor or the experimenter Heinrich Hertz.

Host Computer: A computer attached to a network providing services such as computation, data base access, special programs, or programming languages.

Interactive Video Disc: A system that combines audio, data, and video on an optical disc allowing the user to interact with the program and control its progress.

Interexchange Carriers: Companies that are authorized by federal or state regulatory agencies to provide connections between serving areas. Competitive long distance companies are examples of interexchange carriers.

ISDN: Integrated Services Digital Network - Allows very rapid, simultaneous, high-quality transmission of voice, data. image, and text over a single pair of ordinary telephone wires.

LAN: Local Area Network - The combination of two or more computers that are connected together allowing communication capabilities and sharing of resources.

LATA: Local Access and Transport Area - Another term for serving area.

Lifeline: A special subsidized service which provides qualified customers with low-priced, local telephone service.

Local Exchange Carriers: Companies which provide connections to individual telephone users and process calls within a serving area. These carriers, consisting of local telephone companies, also provide connections to interexchange carriers.

Measured Service: A pricing method by which customers pay a low monthly service rate and also are charged for each call they make. Monthly bills are determined by how much customers use their telephones.

Microwave: A method of transmission in which voice, data, or video signals are beamed by radio waves rather than carried by cable.

Multiplexer (MUX): A device used for multiplexing. May or may not be a stored program computer. Also a device for connecting a number of communication lines to a computer.

Multi-Point Line: A single communications line to which more than one terminal is attached. Use of this type of line normally requires some kind of polling mechanism, addressing each terminal with a unique ID. Also called multi-drop.

Modem: Modulator-Demodulator - An electronic device that converts digital signals into analog signals. Can be used to connect computers and terminals over communications lines.

Narrowcast: Point-to-point communication.

Off-Hook: The conditions existing in a telephone circuit when the receiver or handset is removed from its switch. In other words, the condition of having the transmitter and the receiver in the circuit and ready for use.

Off-Premises Extension (OPX): A PBX or Centrex station line extended to a distant key system or telephone station. Usually this is done via a private line leased from a carrier.

On-Hook: The condition existing in a telephone circuit when the receiver or handset is resting on the switch which then disconnects the circuit.

PABX: Private Automatic Branch Exchange - A centralized phone system, usually on a customer's premises, that connects numerous lines at the premises and routes calls to and from the outside telephone network.

Packet: A group of bits including data and control elements which is switched and transmitted as a composite whole. The data and control elements and possibly error control information are arranged in a specified format.

Packet Switched Network: Transmits data in individual "packets" of information over shared communications facilities for interactive data applications. Provides network access via dial-up or direct connections at asynchronous and synchronous speeds of 300-56,000 bits per second.

Parity Check: Addition of non-information bits to data, making the number of ones in each grouping of bits either always odd for odd parity, or always even for even parity. This permits single error detection in each group.

Point-to-Point Connection: (1) A network configuration in which a connection is established between two, and only two, terminal installations. The connection may include switching facilities. (2) A circuit connecting two points without the use of any intermediate terminal or computer.

Port: A point of access into a computer, a network, or other electronic device; the physical or electrical interface through which one gains access; the interface between a process and a communications or transmission facility.

Private Line: A special service for customers who require constant use of a telephone line from one point to another. This service is frequently used for alarm services.

Resale Carriers: Companies that lease lines in bulk from telephone companies and then offer long distance service (interexchange services) over those lines.

Serving Areas: Geographic areas in which local telephone companies provide local exchange service and connection to interexchange carriers.

Software: A set of computer programs, procedures, rules, and associated documentation concerned with the operation of network computers, e.g., compilers, monitors, editors, utility programs.

Specialized Common Carrier: A company providing private line communications services, e.g., voice, teleprinter, data facsimile transmission.

Subchannel: Part of a broadcast frequency used for services like the radio reading services for the blind or stereo transmission. Referred to as an SCA or subcarrier used to modulate information on another carrier.

Synchronous Transmission: Transmission in which the data characters and bits are transmitted at a fixed rate with the transmitter and receiver synchronized. Eliminates the need for start-stop elements, thus providing greater efficiency.

T-Carrier (T-1): A hierarchy of digital systems designed to carry speech and other signals in digital form, designated T-1 (DS1), T-2 (DS2), and T-4 (DS4). The T-1 carrier transmits at 1,544 megabits per second, typically configures in 24 discrete channels. The T-2 carrier has 96 channels, or equivalent with a 6,312 megabit line rate. The T-4 carrier transmits 274 million bits per second.

Teleconferencing: Allows multiple locations to conference by telephone. There are many types of teleconferencing including: videoconferencing, computer conferencing, and audioconferencing.

Telephone Network: A system for selectively connecting similar switching equipment used to connect similar communications networks.

Terminal Equipment: Any equipment, such as single telephone, PABXs or computer modems, that users connect to their telephone lines.

Tie Line: A private line communications channel of the type provided by communications common carriers for linking two or more PBXs or like systems together.

Toll Call: A call made beyond a customer's local calling area. The charges for such calls are determined by the distance, duration, day, and time of day the call is made.

Translator: A station in the broadcast service operated for the sole purpose of retransmitting the signal of a television station by amplifying and re-radiating those signals without altering any characteristic of the signal except its amplitude and frequency.

Transmission: Sending voice, data, or video signals from one point to another via copper wire cable, fiber optics, satellite or microwave.

Trunk: An industry term for a cable that carries a call to and from a central office. Trunks usually connect groups of several hundred customers through overhead or underground copper wire cables, microwave, or fiber optics.

Two-Wire Circuit: A circuit formed of two conductors, insulated from each other, providing a send and receive channel in the same frequency.

Unit Interval: Duration of the shortest nominal signal element. The longest interval of time, such that the nominal durations of the signal elements in a synchronous system are whole multiples of this interval. The duration of the unit interval (in seconds) is the reciprocal of the telegraph speed expressed in baud.

Universal Service: A goal set forth by the Federal Communications Act of 1934 to keep local telephone service affordable for as many customers as possible. This goal was met for five decades by subsidizing local service with the revenues from long distance calling.

Uplink: A satellite dish that transmits signals up to a satellite.

Video: A system of transmitting TV utilizing bandwidth frequencies from zero to 15 megacycles to carry the picture signals.

Video Conferencing: Allows multiple locations to be connected via satellite for visual and audio conferencing.

WAN: Wide Area Network - WANs serve geographically separate areas enabling data terminals in one city to access data resources in another city or country. Intercity links are most frequently high-speed digital facilities.

WATS: Wide Area Telephone Service - A fixed-rate service by which long distance calls can be made or received without users being charged for each call - "800" numbers are a form of WATS.

ZUM: Zone Usage Measurements - A method of pricing local calls within designated calling zones. Charges for such calls are based upon the length of the call, the time of day the call is made, and the distance to the calling zone.

The following two sources were used to compile this listing:

Linking for Learning: A New Course for Education. Congress of the United States, Office of Technology Assessment, U.S. Government Printing Office, Washington, D.C., November 1989.

Digital Directory. GTE North, Westfield, IN., n.d.