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ABSTRACT

This project provided access to telecommunication networks and research databases at 13 sites in the Mid-Atlantic region from May 1 to June 4, 1993. The project objectives were to pilot a regionally-developed education database; to provide access to this database and the Internet; to train participants to use telecommunications technology; to collect data on the use of the technology; and to generate recommendations to promote and enhance the use of telecommunications technology. Time-of-day and length of use were tabulated by the carrier and the participants were asked to complete an online survey as they exited the education database. This survey included ratings of the four sections of the database: R&D Products, Successful Practices in Math and Science, an Events Calendar, and a Resource Directory. Interviews were also held with 10 people from the four sites with the highest number of hours, who were asked to respond to questions about the mechanical aspects of using the technology, their experience with Internet, their use and impressions of the education database, and ideas for future directions. The report provides detailed information on the study team and the methodology; the results for each site; summaries of responses to the interviews; and conclusions and recommendations both for developing a telecommunications network and for using telecommunications technology. Five appendices include study data, the exit survey questionnaire, and the interview protocol for the pilot sites. An executive summary is also provided. (JLB)

Mid-Atlantic Regional Consortium for Mathematics and Science Education

Technology Use Pilot Test Evaluation Report

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MID-ATLANTIC REGIONAL CONSORTIUM FOR MATHEMATICS AND SCIENCE EDUCATION
Technology Use Pilot Test
Executive Summary

Research for Better Schools (RBS) provided 13 sites access to telecommunication networks and research databases from May 1 to June 4, 1993. The objectives of this effort were to: (1) pilot a regionally-developed education database, (2) provide access to this database and Internet, (3) train participants to use telecommunications technology, (4) collect data on the use of the technology, and (5) generate recommendations to promote and enhance the use of telecommunications technology.

The 13 pilot sites were purposely selected to represent a cross-section of urban, suburban, and rural schools or education resource centers in the five jurisdictions of the Mid-Atlantic region. RBS staff members were available to help connect sites to the Internet carrier and train on-site personnel to use Internet and the education database. The sites had free access to a vast array of telecommunication networks and databases for five weeks. During that time, RBS staff members maintained contact through electronic mail, telephone, and site visits.

Time-of-day and length of use were tabulated by the carrier and the participants were asked to complete an on-line survey as they exited the education database. Additionally, ten on-site interviews were conducted at the four sites with the highest number of hours.

Evaluation Results

A total of 221 hours was logged by the 13 pilot sites. Four sites (one resource center, one private school, and two public schools) accounted for 62 percent of the time on-line (range of 29-37 hours). The other nine sites accumulated fewer hours (range of 3-9 hours), accounting for 38 percent of the total time.

More than half (53 percent) of the hours for all the sites were logged during regular school hours. Users averaged more time per session on-line during and after school, but this average varied from site to site (range of 8.5-45 minutes). A low number of total hours did not necessarily correlate with low averages of on-line time. Some "lower" use sites had averages of 42 to 45 minutes.

Survey Results

RBS received responses from 77 on-line exit surveys. Most of the survey respondents were teachers (73 percent). Another 16 percent were either administrators or media specialists. About one third of all the respondents rated themselves high in level of experience with computers, a third rated themselves as having some or a moderate amount of experience, and a third rated themselves as having little or no experience. Most (81 percent) had good access to computers in terms of time and location.

They rated the four sections of the education database and their overall satisfaction with telecommunications technology using a 4-point scale with 4 being the highest rating. Three sections of the education database (R&D Products, Successful Practices in Math and Science, and the Events Calendar) received ratings of 3.0 or better, with the fourth, the Resource Directory, rated 2.9. Overall satisfaction with using the technology was rated at 3.1. Very few (8 percent) reported little or no satisfaction with the system.

Interview Results

Ten people from four sites were asked to respond to questions about: (1) mechanical aspects of using the technology, (2) their experience with Internet, (3) their use and impressions of the education database, and (4) ideas for future directions. Their responses are summarized below.

- Equipment and Negotiating the Network

  Two kinds of problems were identified, initially connecting to the local carrier and accessing telecommunications networks and databases. The latter was typically because the "lines were busy." Problems with connecting to the carrier were resolved with software packages appropriate to IBM or MacIntosh computers.

  People talked about two ways of dealing with problems negotiating the Internet. The more experienced tended to persevere, recognizing, as one said, "There is no expert, there is a small level of intuition and I'm good at making educated guesses." The less experienced relied on someone more experienced to show them what to do, reporting they got better with practice.

- Using the Internet

  All of the respondents accessed electronic mail systems, bulletin boards, and other interactive networks. Two teachers found pen pals for their students. One student enjoyed the newsgroups. The networks were not without their critics, as two observed that the menus can be misleading and, occasionally, a "waste" of time.

  When using the Internet as a resource for information, all of the respondents agreed that the amount of information was overwhelming. They talked often about not knowing where they were or how they got there, but enjoyed the search nonetheless.

  Computer specialists at three sites reported that once they were familiar with the information possibilities, they looked for information that had practical application for teachers. Teachers who used the system did the same, reporting they downloaded information for future use in their classrooms (e.g., authentic texts for foreign languages, and science, history, and English information).

- The Education Database

  The response to the database was very positive. People gave specific examples of how they found the database useful: (1) a physics teacher contacted the original author of a "successful practice" for more information, (2) a teacher who coordinates staff development found information on critical thinking and liked having the abstracts, and (3) a specialist from a resource center liked the calendar because she plans workshops and wants to know when other conferences are scheduled. People reported that the database was "extremely easy" to access and move around in. Suggestions for the database included: (1) printing the whole calendar or highlighting events specific to a state or region, (2) providing information on education grants, and (3) generating a "tip list" of useful information and where to find it.

- Future Directions

  Their limited experience whetted everyone's appetites. People wanted to know how they could continue using Internet. Participants saw practical applications for classroom teachers and wanted computers to be a part of every classroom. The two biggest concerns were where to get funding and how to get administrative support.

Conclusions and Recommendations

- Developing a new database that pooled information from a variety of sources was extremely time-consuming. Future designers should anticipate needing as much as four months. Once established, making additions or deletions to the database should occur easily.

- A great deal of variability exists in schools and other educational settings in the type of equipment available and in the training and experience of the local "expert." Technical assistance needs to be responsive to these varying conditions.

- Training required a minimum of two and a half hours. People need to have hands-on experience with the technology on their own computers and plenty of time to practice with an experienced person readily available to answer questions and solve problems.

- State education agencies that have existing networks should explore ways to provide connections to Internet.

- Information that prepares people to use telecommunications technology should include practical examples for practitioners by content area and grade (and where to find it).

- Information should be provided on where to find funds (e.g., names of businesses and industries willing to sponsor technology). School leaders should have hands-on experience to see the practicality for classroom instruction and eventual cost effectiveness of using technology versus traditional (i.e., printed) media.

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Introduction

Research for Better Schools (RBS) serves as the Mid-Atlantic Regional Consortium for Mathematics and Science Education, a partnership that brings RBS together with other key agencies in the region to promote systemic reform in mathematics and science education. One of the consortium's objectives is to enhance communication through the use of telecommunications technology for nationwide information sharing. As part of its participation in the consortium, RBS piloted the use of telecommunications technology by providing access to communication networks and databases to 13 pilot sites for five weeks (May 1 to June 4, 1993). The objectives of the pilot test study were:

- to design a structure for and pilot an education database that would include: (1) successful practices in mathematics and science, (2) educational products and materials, (3) an education resource directory, and (4) a calendar of upcoming events relevant to educators
- to provide participants with access to this database together with full access to the Internet
- to train and encourage participants to access and use Internet and the education database
- to collect information about the ease of use of this technology, the frequency and duration of use, the types of use and users, the relevance of the education database, and the problems encountered and resolved
- to generate recommendations about the role the laboratories can play to promote and enhance the use of telecommunications technology to reform mathematics and science education.

The evaluation of the pilot test focused on the following activities: (1) designing and developing an education database, (2) selecting a carrier for provide access to telecommunication networks, (3) selecting pilot sites, and (4) training personnel at the sites. The evaluators served on the study team that planned the study.

In addition, the evaluation sought to capture the experiences of participants during the pilot test. Data were collected by on-line surveys and tracking of use during the pilot test, on-site interviews and RBS trainers' notes at the end of the pilot phase, and observational notes at a reception for the pilot site participants. Survey results were analyzed to calculate frequencies and percentages of responses per item. Means and standard deviations were calculated for non-nominal items. Frequency and duration of on-line computer use were summarized by site and time of day with totals, percentages, and averages calculated for each site and time period. Observational and interview notes were analyzed and coded for recurring themes. The remaining sections of this report describe the pilot test, summarize the results, and present conclusions and recommendations.

Description of the Pilot Test

Study Team

An RBS study team composed of the computer coordinator, two members of the resource center staff, three members of the consortium project staff, two liaison/trainers for the pilot sites, and two evaluation unit staff members was formed for the purpose of planning and conducting the pilot test. The team met weekly to coordinate the various people and activities involved in the pilot. Beginning the end of February, the team met to discuss such issues as: network carrier options, the design and content of the education database, criteria for selecting pilot sites, timelines, equipment needs for sites, cost per site, and evaluation needs and methods. The team worked most effectively when members were assigned specific responsibilities with deadlines. For example, the computer coordinator explored the advantages and disadvantages of the different network carriers and identified the equipment needs. The resource center staff designed the structure for the database and entered the data, while the consortium staff gathered information about successful practices in math and science from the regional laboratories.

Since the pilot test needed to be completed by the end of the school year, the team determined the amount of time required for the key activities by mapping backward. Table 1 displays the timeline and activities leading up to and including the pilot test. For example, the team wanted the participants to have four to five weeks to pilot the technology and database; counting backwards, the sites had to be connected to the network carrier and trained by May 1. The team anticipated that two months would be necessary to set up networks and database. The team planned to have a sample of the database and on-line survey to the telecommunications carrier by early March, the full updated database to the carrier by the end of March, and the sites selected by April 1, connected to the carrier by mid-April, and trained by April 30 for the pilot test to begin May 1. The month of April was designated for working out mechanical problems. This turned out to be an ambitious estimate that required modification since the database was still being edited in late April.

After exploring several options for network carriers (e.g., PennLink, SERVE-Line, OERI, and JvNCnet), the team decided to use JvNCnet in Princeton, New Jersey, because of its ease of access to Internet, data storage capacity, ability to track time and duration of on-line use, ability to load the education database and on-line survey, reasonable cost, and ability to meet timelines. Subsequently, at the request of the RBS computer coordinator, JvNCnet added the capability for users to download files for printing.

Table 1

Timeline for the Pilot Study

Activity	Time Period
First study team meeting.	Late February
Select carrier (JvNCnet). Study team meetings continue weekly.	Early March
Data edited/entered. Sample database to carrier. Study team meetings continue weekly.	Mid-to-late March
Data edited/entered. Accounts activated. Pilot sites selected. Study team meetings continue weekly.	Early April
Sites connected to carrier. Sites trained. Final database/ survey on-line. Study team meetings move to bi-weekly.	Mid-to-late April
Sites pilot telecommunication system. Study team meetings continue bi-weekly.	May
Pilot ends. Reception for sites.	June 4-10

Education Database

The education database contained four sections.

- R&D Products - brief summaries of selected products from regional educational laboratories, national research centers, and other educational organizations; products include curriculum materials, position papers, directories, assessment information, and other documents.

- Successful Practices in Mathematics and Science - brief summaries of programs, curriculum materials, instructional strategies, and assessment tools in math and science, contributed by the regional educational laboratories and rated "successful" in terms of their innovativeness, effectiveness, and transferability.

- Resource Agency Directory - summary information on state, regional, and national organizations that offer a variety of services to educators.

- Events Calendar - listing of upcoming meetings, conferences, and training of interest to educators.

The development of the successful practices in mathematics and science section consumed the most time. Collecting information from the regional laboratories, editing and preparing the information for entry, entering the information into the database, and rechecking the data took much longer than anticipated, taking close to two and a half months. The longest delay was caused by the need to re-write information coming in from the laboratories to match the database structure.

Pilot Sites

The selection of pilot sites went through several iterations. Initially, the committee wanted ten sites that would represent the five jurisdictions in the Mid-Atlantic region, demographic diversity, public and private schools, non-school settings that serve educators, and diversity of staff computer experience. Interestingly, as word spread that RBS was conducting the pilot, several districts contacted RBS to volunteer so the committee agreed to expand the number of sites to 15. One site later dropped out because of a delay in connections and a second site never became active because of time conflicts with the scheduling of the pilot study.

Thirteen pilot sites actively participated in the study. Table 2 contains a list and descriptive characteristics of the sites. The sites were not as representative of the Mid-Atlantic region as intended, with a preponderance of sites in Pennsylvania (7), including a resource center, two private high schools, three public high schools, and a middle school. Three sites (a resource center, an elementary school, and a high school) were in New Jersey. The remaining jurisdictions, the District of Columbia (middle school), Delaware (rural high school), and Maryland (rural high school), each had one public school participating.

Table 2

Pilot Site Descriptions

Site Name Location	Type of Site	Number Students/Teachers	Racial/Ethnic Distribution	Contact Person Position	Computer Equipment
Science & Math Demonstration Ctr. Backus Junior H.S. Washington, DC	Urban Public Junior High School	300/30	African American - 90% Other - 10%		IBM PC's
Dobbins Vocational Technical High School Philadelphia, PA	Urban Public Vocational Technical High School	1,950/300	African American - 99%	Teacher	MacIntosh PC's
Educational Information Resource Center Sewell, NJ	Regional Resource Center	300/300 serviced per month	N/A	Research Coordinator	IBM PC's MacIntosh PC's
Francis Scott Key High School Unionbridge, MD	Rural Public High School	800/40	Predominantly White	Computer Coordinator	MacIntosh PC's Labs with 25 to 30 computers.
George School Newtown, PA	Suburban Private High School	535/85	White - 74% African American - 9% International - 8% Asian - 5% Hispanic - 3%	Technology Specialist	MacIntosh PC's
George Washington High School Philadelphia, PA	Urban Public High School	3,200/200	White - 66% African American - 25% Asian - 7% Hispanic - 2%	Technology Coordinator	MacIntosh PC's

Table 2 (Continued)

Site Name Location	Type of Site	Number Students/Teachers	Racial/Ethnic Distribution	Contact Person Position	Computer Equipment
Cape Henlopen High School Lewes, DE	Rural Public High School	1,000/65	White - 71% African American - 26% Hispanic - 2% Asian - 1%	Science Teacher	6 IBM PC's 1 Modem
Haddonfield High School Haddonfield, NJ	Suburban Public High School	554/75	Predominantly White	Physics Teacher	MacIntosh PC's IBM PC's
Montgomery County Intermediate Unit Erdenheim, PA	Suburan Regional Resource Center	116,538/ 4,500	N/A	Supervisor, Technology Services	IBM PC's MacIntosh PC's
Mt. Saint Joseph's High School Flourtown, PA	Suburban Private High School	550/52	White - 95% Other - 5%	Technology Coordinator and Computer Teacher	MacIntosh PC's
Neshaminy School District Langhorne, PA	Suburban Public High School	9,659/616	White - 95% Other - 5%	Technology Specialist for District	IBM PC's
Parkview Elementary School Westfield, NJ	Rural Public Elementary School	436/30	White - 80% African American/ Hispanic - 20%	Computer Specialist/ Teacher	6 Apple 2G's
Souderton Middle School Souderton, PA	Rural Public Middle School	5,300/350	White - 94% Asian - 3% Hispanic - 2% African American - 1%	Supervisor of Science and Technology	MacIntosh PC's Windows, LAN

The contact persons at the sites held various positions and, with one exception, were considered to be the technical "expert" in their district, school, or center. Three were regular classroom teachers who assumed the added responsibility of technology coordinator. Three were half-time technology coordinators and half-time teachers. Six were full-time computer specialists or supervisors and one contact person was the information director of a resource center.

All the pilot sites had the minimum hardware needed to participate. Mechanical problems were encountered connecting five of the sites to JvNCnet which resulted in a delayed start for one of the sites. Other difficulties centered on the time needed to set up modems, to program communications software, and, at some sites, to establish a SLIP connection for Macintosh computers which enabled users to have direct access. The trainers noted, however, that despite these "system hurdles" study participants were eager to get on and use the Internet.

Since materials from JvNCnet were geared toward more experienced users, the RBS staff trainers quickly drafted a training manual[1] pulling information from a variety of sources (e.g., Zen and the Art of the Internet, Kehoe, 1993) and from their own experience with the system. Training sessions averaged two to two and a half hours and, except for one site where training was done by FAX and phone, all training was done on-site and completed by the beginning of the pilot. The trainers reported that the initial personal contact was vital to the success of engaging people to actively participate in the study. The trainers found that return visits were not necessary for most of the sites and maintained contact by phone and electronic mail.

Evaluation Results

On-line use (from time of entry to exit) was tracked by JvNCnet for the 13 sites from May 1 to June 4 (see Appendix A). Since the accounts were established for each site, JvNCnet tracked use by sites and not individuals. Nonetheless, the number and type of users could be extrapolated, to some extent, through the on-line surveys and on-site interviews. This information and the purpose for using the system are discussed in the next section of the report.

Three factors were examined: (1) total time (hours and minutes), (2) total frequencies (number of log-ons over one minute), and (3) average time on-line for each site and time period. This provided information about who used the computers, when they used them, and how much time they invested; the assumption being that the longer someone stayed on-line the more engaged they were.

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1. The manual is in revision and will be available by Fall, 1993.

Time On-Line By Site and Time of Day

Table 3 summarizes the hours logged on the network per site. A total of 221 hours was logged during the five-week period. Four sites (one resource center, one private school, and two public schools) accounted for 62 percent of the time on-line with a range of 29 to 37 hours. The other nine sites accumulated fewer hours, with a range of three to nine hours, accounting for 38 percent of the total time. The average time on-line varied quite a bit from site to site, with a range of nine minutes to 45 minutes per session on-line. It is important to note that a low number of total hours at some sites did not necessarily correlate with low averages of on-line time. For example, three of the "lower" use sites had averages of 42 to 45 minutes per session on-line, suggesting a high level of engagement by a fewer number of participants.

Table 4 summarizes the hours logged on by the time of day. More than half (53.0 percent) of the hours for all the sites were logged during regular school hours, followed by after school (19.2 percent) and evening use (13.8 percent). Users averaged more time on-line during and after school (27 minutes) than before school or in the evenings (21 or 20 minutes).

Survey Results

Another method of evaluation during the pilot test was an optional on-line survey (Appendix B), completed by users as they exited the education database. The purpose of the survey was to identify the individual users and sections of the education database they searched. Users also were asked to rate the usefulness of the database and their overall satisfaction with the telecommunications system. Some users who accessed the education database repeatedly completed more than one survey, depending on which section of the database they examined. Others partially completed the survey or opted not to complete it at all. Appendix C lists the number of survey respondents and surveys per site. After the surveys were completed, they were sent to a separate file for storage and then forwarded to RBS. RBS received responses for 77 surveys. This underestimates the total number of surveys completed because survey data were lost from the file for eight days early in the pilot due to a malfunction with the network carrier.

Table 3

Hours Logged By Site

Site	Hours Logged (Frequency)	Percent of Hours Logged (Frequency)	Average Time On-Line Per Session
Science & Math Demonstration Center	08:00 (23)	3.6 (04)	:20
Dobbins Vo-Tech High School	09:33 (18)	4.2 (03)	:32
Educational Information Resource Center	19:32 (44)	8.6 (08)	:26
Francis Scott Key High School	10:43 (14)	4.7 (03)	:45
George School	04:29 (18)	1.9 (03)	:15
George Washington High School	16:24 (23)	7.3 (04)	:42
Cape Henlopen High School	29:37 (113)	13.2 (21)	:15
Haddonfield High School	06:50 (33)	2.9 (06)	:12
Montgomery County Intermediate Unit	29:08 (64)	13.2 (12)	:27
Mount Saint Joseph	37:02 (50)	16.7 (10)	:44
Neshaminy School District	10:12 (40)	4.6 (08)	:15
Parkview Elementary School	36:25 (61)	16.4 (12)	:35
Souderton Middle School	03:08 (22)	1.3 (04)	:09
TOTAL	221:03 (523)	100.0	

Table 4

Hours Logged By Time of Day

Site	Total Hours Logged (Frequency)	Percent of Total Hours Logged (Frequency)	Average Time On-Line Per Session
Before School (6:00-8:00 a.m.)	10:08 (28)	4.6 (5.4)	:21
During School (8:01-2:30 p.m.)	117:02 (260)	53.0 (49.6)	:27
After School (2:31-6:00 p.m.)	42:50 (95)	19.2 (18.1)	:27
Weekday Evening (6:01-Midnight)	30:45 (90)	13.8 (17.2)	:20
Weekend (Anytime)	20:18 (50)	9.1 (9.5)	:24
TOTAL	221:03 (523)	100.0	

Each item is analyzed and reported upon separately. According to the survey, most of the users were teachers (73 percent), followed by administrators (10 percent), and media specialists (6 percent). Eleven percent of the respondents identified themselves as "Other." During the interviews, it was learned that students had access to the system, and, since that choice was not on the survey, it is likely that some of the other respondents were students.

Table 5

User Positions

Position	Number	Percent
Teacher	45	72.6
Media Specialist	04	6.4
Administrator	06	9.7
Other	07	11.3
TOTAL	62	100.0

About one-third of the respondents rated themselves high in level of experience with computers and telecommunications systems, a third rated themselves as having some or a moderate amount of experience, and a third rated themselves as having little or no experience.

Table 6

User Experience

Experience	Number	Percent
Little/none	19	31.1
Some	10	16.4
Moderate	12	19.7
High	20	32.8
TOTAL	61	100.0

Most of the respondents (81 percent) had easy and convenient access to computers, while three percent reported little access in terms of time or convenient location of the computers.

Table 7

User Accessibility to Computers

Accessibility	Number	Percent
Little	02	03
Moderate	10	16
Good	10	16
Excellent	40	65
TOTAL	62	100.0

The survey item that asked which sections of the database were searched was not analyzed. Due to the limitation of the response mode for the on-line survey, only the first four entries were counted, including commas and spaces. For example, if users entered commas after numbers (e.g., 1, 2, 3) only sections 1 and 2 were recorded, but if the response were "123", then all three sections would be recorded. For the most part, users explored the database without a specific question or purpose in mind. Thirty-three percent indicated they did have a specific reason for searching the database, but 67 percent did not.

Users rated the usefulness of the information in the four sections of the database on a 4-point scale with 4 being the highest rating. Table 8 displays the means and standard deviations of the four database sections plus overall satisfaction with the telecommunications system. Three of the sections (R&D Products, Successful Practices, and the Events Calendar) received ratings of 3.0 or better, with the Directory rated at 2.9, indicating that the study participants found the information highly useful. Additionally, overall satisfaction with using the telecommunications technology was rated at 3.1. Very few (8 percent) reported little or no satisfaction with the system.

Table 8

Participants' Ratings of the Education Database and Overall Satisfaction

	Item	Mean	Standard Deviation
1.	Resource Agency Directory	2.9	.92
2.	Research and Development Products	3.0	.92
3.	Successful Practices in Mathematics and Science	3.0	.98
4.	Events Calendar	3.2	.90
5.	Overall satisfaction with the Telecommunication System	3.1	.96

Note: Ratings can range from a low of 1.0 to a high of 4.0. Items 1 through 4 ask the respondent to rate the level of usefulness of the information provided in the database.

Interview Results

A final method of collecting information for the pilot phase was to conduct on-site interviews (Appendix D) with people at the four sites that logged the highest amount of time (62 percent of the total) during the pilot. It was anticipated that people who had the most experience with the telecommunications technology and education database would be the most informed to discuss their experience. Interestingly, these sites also reflected a cross-section of the sample. Appendix E lists the interview sites, the total number of hours and minutes logged, and the people interviewed. A total of ten people were interviewed in groups of two or three; six were teachers (three were also the computer specialist or technology coordinator), two were full-time technology specialists, one was a librarian, and one was a student. The level of experience of the group varied from very little prior to the pilot test (three people) to highly experienced (three people). The other four considered themselves to be proficient, but not experienced with telecommunications.

Respondents were asked to talk about four broad topics: the mechanical aspects of using telecommunications technology, experiences using the technology (where they searched and why), experience with the database, and future directions. In addition, supporting information for these areas was obtained during a reception for the participants at the end of the pilot test, during which people talked about their experiences and their hopes for the future.

Equipment and Negotiating the Network

- Two sites had a mixture of IBM (or IBM compatibles) and MacIntosh computers and two sites had Apple or MacIntosh computers, exclusively. People talked about two kinds of problems with the mechanical aspects of using the system, one with initially connecting through JvNCnet and the other with connecting to telecommunications networks or databases. The latter was typically because of the time of day and the "lines were busy." Problems with connection to JvNCnet were resolved with MacIntosh computers through the use of a SLIP connection and a software program called Versaterm from JvNCnet that enabled users "direct access to anything on Internet." For the IBM computers, a software program called Procomm worked well.

  The most frustrating thing for people was not understanding what they were doing "wrong" when a connection was incomplete or an error statement appeared on the screen. People talked about two ways of dealing with problems. One group, usually the computer specialists, talked about a willingness to keep trying. One computer specialist voiced a philosophy that seemed to be shared: "This is the only field where things go wrong constantly. There is no expert...there is a small level of intuition and I'm good at making educated guesses." The other group, usually the less experienced, talked about asking someone they perceived to be more experienced for help and getting that help immediately. One novice teacher remarked, "Show and tell is definitely the way to go. Once you have success you will play around on your own." Everyone agreed they got better at maneuvering through the system with practice.

  Interestingly, the language people used to talk about using telecommunications technology was filled with travel terms, rarely library terms. People did not "browse." They talked about "fast travel"... "finding places," "telling us where they've been," and "wandering." Gopher and TurboGopher were two "highways" that people found very user-friendly for "traveling" to different networks and databases.

Using Internet

- One computer specialist/teacher stated, "I see two uses--to communicate and as a resource for information. Communication is very motivating." This seemed to reflect everyone's experience. All of the respondents said the first thing they did was access some form of electronic mail or interactive bulletin board or network. Two teachers with special education students found pen pals from Washington State, Virginia, and Texas for their students through the Internet. One of the teachers said that having pen pals in other places "motivates them [students] to

learn more about where they are from. We look up on the map where they are, the places become real." The high school student said he found the news groups the most interesting: "I like to see what's going on from different perspectives, read the discussions and analysis. It's like a conversation."

The networks were not, however, without their critics. One respondent declared, "I found a lot of drivel on the Internet. When you get the menus you think it will be interesting and then you get there and it's a waste." One of the younger users reported that college students are the ones who have a lot of access through universities and they can "get goofy" with the on-line discussion groups.

- When using Internet for information, the response was unanimous. "The amount of information is daunting"..."the challenge is trying to remember where we got stuff from and how we got there"..."I found it's positively addictive, but I like to think it's purposeful wandering"... "I did the initial digging for teachers, otherwise they would be overwhelmed. I found a lot on Internet, but I didn't know where I was!"..."Nobody knew where to start. Internet has so much information. I'd get on with one idea and would get drawn in different directions and two hours would fly by...".

  The computer specialists at three sites reported they took the time to familiarize themselves with the information possibilities and, as one said, "I had the perspective of teachers in mind." Another looked up information she knew the teachers would like, printed it, and wrote messages like, "Guess what I committed you to." The librarian said, "I was just exploring. I had questions at times, when teachers had questions, or just something I was interested in." She would say to the teachers, "Look what I've got."

  The computer specialists at the sites believed the teachers want information they can use with their students, and the teachers interviewed confirmed this. The foreign language teacher had specific reasons for using Internet. He liked having authentic text (French newspapers) that he downloaded and printed for the students. "It's good for grammar, comprehension, and culture," he said. Another computer specialist found information on the Revolutionary War and NASA for her first, second, and fifth grade teachers. A science teacher accessed Spacelink and followed the space shuttle activities with his students. A high school English teacher at the reception told everyone, "I am a convert to Internet." She has been working on a writing project to use with other English and history teachers to tie up with other schools.

  Since everyone saw immediate practical application in the information they were finding, it was very fortunate that RBS had requested the program to download and print. One computer specialist said she has "two huge folders of information." A teacher said he "downloaded three or four editions of the French press to use next year." Others had similar experiences.

Using the Education Database

- As part of the pilot, all sites examined the education database. The response from the interview sites was very positive. For the most part, people accessed successful practices in mathematics and science, the research and development products, and the events calendar. People gave specific examples of how they found the database useful. The librarian said she passed along information from successful practices to a physics teacher who contacted the source of the practice for more information. A teacher who coordinates staff development in his school said he found very useful information on critical thinking in R & D Products and particularly liked having the abstracts to read. The specialist from the resource center said she "loved" the calendar. She liked knowing what else was going on because she plans workshops and wants to know when competing conferences are scheduled. She also liked the directory for providing information to teachers about different education-oriented organizations and associations. Another said she liked the fact she could contact people to find out more information.

- People reported that accessing the database was "extremely easy". One teacher said, "I liked the WAIS score because it let me know which of the abstracts were most useful."[2] The database was "very user-friendly, more linear, and followed a consistent format," according to another. Several respondents had similar comments. Only one site reported difficulty with finding the appropriate descriptor word. When asked if they used the list of words they had been given (during training), the response was "Teachers aren't going to sit there and go through a book, they're going to list a word and see if it works."

- Several people had suggestions for the database. One thought the regional laboratories should continue to provide information abstracted according to topics. Another thought the calendar should highlight events specific to a state or region. Another commented about the calendar that she would like to see "a way to print the whole thing out" so she could see everything at once. Another suggestion was to have information on where to get education grants. A final comment was that labs should pull together information about what others have found useful, and where they found the information, to generate a kind of "tip list."

Next Steps and Future Directions

- Everyone had thoughtful comments about what needed to happen next to make computer technology available and to get teachers actively involved. Although several stated that one month was not enough time, their limited experience had whetted their appetites for more. Everyone wanted to know how to keep their accounts open. Examples of comments included:

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2. Wide Area Information Server (WAIS) searches to find requested information according to a descriptive word or words, then retrieves and indexes the information on the screen in rank order of the frequency with which the descriptor word appears in the text (the "score" in the teacher's words).

Computers shouldn't be isolated from classrooms. The computers in my lab have wheels and are being moved around now, so I know it can happen.

Once they (teachers) do it, word-of-mouth gets others involved. It will create a demand for computers.

We need a mandate from the top and some money. Need to show people what you can do.

Need the opportunity to practice....someone to show the way, a person between the teacher and the system. It can be intimidating.

The best blend is the teacher who has content knowledge and the tech person who can use the network.

Need a list of 'how-to's.' If you find a good resource, document how it is useful.

The primary thing is to have a fixed cost....You need someone who is comfortable with the technology and can 'hold hands' of people learning.

We have the tradition of being 'paper trained;' we need leaders who value electronic data and communication, but I see it coming from the grass-roots and librarians.

Conclusions and Recommendations

The conclusions and recommendations are organized into two sections, those that relate to developing a telecommunications network and those that relate to practitioners using telecommunications technology. They are based on RBS staff and practitioners' experiences during the pilot test.

Developing a Telecommunications Network

- Designing and developing a new database that pooled information from a variety of sources was extremely time-consuming. Designing a consistent structure was important, but the many steps involved in generating the standardized text format took more time than anticipated. When "starting from scratch," anticipate needing as much as four months. Hopefully, once established, making additions or deletions to the database can occur easily.

- A great deal of variability exists in schools and other educational settings in the amount and type of equipment available (although most of the sites had Apple and MacIntosh computers), and in the training and experience of the local people who are identified as the technical or computer specialist. For this pilot, as a general rule, it was advantageous for schools to have a computer with a hard drive, a 9600 baud modem, and the Versaterm SLIP software package for a MacIntosh.

Technical assistance will need to be provided by knowledgeable people with experience in a variety of computers, modems, and software packages.

Once connected, everyone really liked SLIP and Versaterm. However, because the SLIP technology had not been programmed to fit the particular parameters of the pilot sites' telecommunication needs, setting up the system was time consuming and, as one trainer noted, "seemed to take the wind out of our sails at the beginning of every first training session." It is vital to schedule enough lead time to work out all the problems before initiating training.

- Training took a minimum of two and a half hours the first time on-site. One trainer suggested a "very short tutorial guide: no more than four pages" to get people started. She noted that "nothing sells the use of Internet and the database information faster than quick access and quick results." It is important to have an easy-to-read manual. Several people commented that Zen, and the Art of the Internet (Kehoe, 1993) should be "required reading." The RBS manual has adopted a similar conversational style and is organized to present both shortened (in highlighted boxes) and detailed information, which should be helpful to people with different levels of experience. People need to have hands-on experience with the technology and time to practice.

- Not a lot of carriers offer a wide range of access, are affordable, flexible, and familiar with working with public and private schools. There is an opportunity for state education agencies to provide this service through existing networks (e.g. PennLink in Pennsylvania and NJLink in New Jersey).

Using Telecommunications Technology

- Everyone suggested that training and access to telecommunications technology begin with the school year or even during the summer. so teachers can integrate the technology into their curriculum and instruction.

- Having someone on-site (or reachable by phone) to answer questions and solve problems quickly was vital to the success of the pilot test. People want someone close at hand or readily accessible by phone. In two of the low-use sites, the specialists were trying to learn themselves and did not have the time to keep trying or have ready access to someone to help them. Before the on-site computer or technology specialists can be expected to train teachers, they will need to become thoroughly familiar and comfortable with the technology themselves.

- An additional benefit was the ability of some of the specialists to extract, out of the vast array of Internet information, concrete examples that could help teachers in their classrooms. The greatest appeal for teachers was learning how practical the information was. People liked having "authentic" material that was "current" and having access to something that was so quick and responsive. There was repeated evidence that people love sharing and hearing what other people had tried and liked. During the reception, as people talked

about "the places they had been," others were hurriedly taking down the information. Information that prepares people to use telecommunications technology should include practical examples by topic and grade and how/where to find it.

- A variety of electronic mail systems exist. Some were considered more user-friendly than others. Pennsylvania's LearningLink (PENNLINK) was considered easier to use than "elm" on JvNCnet's Tigger.

- Participants raised two concerns about the use of the Internet with access for all teachers: money, and resistance from administrators. One of the site contact persons brought her superintendent to the reception at RBS and "she was so impressed hearing what others are doing." They are starting a technology committee and the specialist will be training parents in the community. Information should be provided on funds available and the names of business and industry willing to sponsor technology. School leaders (e.g., school board members, superintendents, and principals) should have hands-on experience to see the practicality for classroom instruction and eventual cost effectiveness of using technology versus traditional (i.e., printed) media.

A group of educators, representing the Mid-Atlantic region, has had access to Internet and a regionally-generated education database for a brief five-week period. In that time they "had a glimpse of some of the possibilities" and eagerly await the opportunity to continue and expand. RBS was able to provide support and work in partnership, learning as much from them as they from us.

APPENDIX A

Hours Logged On System By Site

Number of Hours (and Sessions) Logged By Site

Site	Before School (6-8)	Weekdays During School (8:01-2:30)	After School (2:31-6)	Evening (6:01-Midnight)	Weekend	Total # of Hours Logged (Frequency)	Percent of Hours Logged On (Frequency)	Average Time On-Line
Science & Math Demonstration	00:52 (3)	00:55 (3)	02:00 (7)	00:29 (4)	03:44 (6)	08:00 (23)	03 (04)	:20
Dobbins Vo-Tech High School	00:00 (0)	07:16 (12)	00:11 (2)	00:00 (0)	02:06 (4)	09:33 (18)	04 (03)	:32
Educational Info. Res. Ctr.	00:00 (0)	13:00 (26)	03:51 (15)	02:41 (3)	00:00 (0)	19:32 (44)	09 (08)	:26
Francis Scott Key High School	00:00 (0)	00:13 (1)	00:00 (0)	05:50 (8)	04:40 (5)	10:43 (14)	05 (03)	:45
George School	00:00 (0)	00:38 (6)	00:15 (2)	01:56 (6)	01:40 (4)	04:29 (18)	02 (03)	:15
George Washington H.S.	05:22 (6)	09:39 (13)	00:00 (0)	01:23 (4)	00:00 (0)	16:24 (23)	07 (04)	:42
Cape Henlopen High School	03:43 (17)	02:57 (13)	03:55 (16)	12:57 (41)	06:05 (26)	29:37 (113)	14 (21)	:15
Haddonfield High School	00:11 (2)	05:42 (27)	00:57 (4)	00:00 (0)	00:00 (0)	06:50 (33)	03 (06)	:12

Appendix A (Continued)

Site	Before School (6-8)	Weekdays During School (8:01-2:30)	After School (2:31-6)	Evening (6:01-Midnight)	Weekend	Total # of Hours Logged (Frequency)	Percent of Hours Logged On (Frequency)	Average Time On-Line
Montgomery Cnty Intermediate Unit	00:00 (0)	21:13 (43)	06:42 (18)	00:08 (1)	01:05 (2)	29:08 (64)	14 (12)	:27
Mount Saint Joseph	00:00 (0)	17:00 (36)	18:44 (6)	01:16 (7)	00:02 (1)	37:02 (50)	17 (10)	:44
Neshaminy School District	00:00 (0)	02:30 (8)	02:41 (14)	04:05 (16)	00:56 (2)	10:12 (40)	04 (08)	:15
Parkview Elementary Sch.	00:00 (0)	33:32 (53)	02:53 (8)	00:00 (0)	00:00 (0)	36:25 (61)	17 (12)	:35
Souderton Middle School	00:00 (0)	02:27 (19)	00:41 (3)	00:00 (0)	00:00 (0)	03:08 (22)	01 (04)	:09
Total Hours Total Frequency	10:08 (28)	117:02 (260)	42:50 (95)	30:45 (90)	20:18 (50)	221:03 (523)		

APPENDIX B

On-Line Exit Survey

Technology Transfer Evaluation

On-Line Exit Survey
Technology Transfer Evaluation

SAMPLE

1. Last name _____

2. What is your position? Enter number.

1	teacher	3	administrator
2	media specialist	4	other

3. Rate your level of experience with using telecommunications on a scale of 1 to 4 with 4 being the most experienced. _____

4. Rate the level of accessibility, in terms of opportunity and location, to the computer on a scale of 1 to 4 with 4 being the most accessible. _____

5. Which data bases did you search this time? Enter number(s).

1	Directory	3	Successful Practices
2	Products	4	Events Calendar

6. On this occasion, did you have a specific question in mind when you searched?

_____ Yes _____ No

7. Using a scale of 1 to 4 with 4 being the most useful, rate the data bases on the usefulness of the information to you:

Directory	_____	Successful Practices	_____
Products	_____	Events Calendar	_____

8. Rate your overall satisfaction with using this system as a resource for information on a scale of 1 to 4, with 4 being the highest level of satisfaction. _____

APPENDIX C

On-Line Survey Respondents

Frequency by Site

On-Line Survey Respondents
Frequency by Site

Site	Number of Users	Number of Surveys
Science and Math Demonstration Center	1	1
Dobbins Vocational Technical High School	1	2
Educational Information Resource Center	2	9
Francis Scott Key High School	1	0
George School	1	2
George Washington High School	2	16
Cape Henlopen High School	2	5
Haddonfield High School	1	3
Montgomery County Intermediate Unit	3	7
Mount St. Joseph High School	3	9
Neshaminy School District	2	1
Parkview Elementary School	12[a]	19
Springfield[b]	1	3
Souderton Middle School	1	0
	32	77

[a] Student use is not included

[b] No on-line time logged after May 1

APPENDIX D

Technology Use Pilot Test

Exit Interview Protocol for Pilot Sites

Technology Use Pilot Test
Exit Interview Protocol for Pilot Sites

Introduction and Purpose of Interview

The purpose of the study was to pilot the use of telecommunications technology along with a set of databases developed by RBS in collaboration with other regional education laboratories. We are interested in finding out how useful this technology and kind of databases are to practitioners.

Two sets of questions surround the use of technology by educators. One set concerns the mechanics of the operation and the other concerns the information disseminated through the networks.

Background Information on Site and Contact:

1. Size and population of district.

2. History of the use of technology at this site.

   - When and how introduced computer use
   - What equipment do you have at (name of site)?
     Number and types of computers, software, modems.
   - Student and staff use
     Where is the equipment located?
     Who has access?
     Frequency of use?
     Purpose for use?
   - Staff development/training for computer use

3. Background and experience of technology contact.
   - Prior experience with telecommunications network(s)

Mechanics of Network

1. What was involved in preparting to participate in the pilot?

2. Did the system work mechanically as it was supposed to? Any problems? If yes, what kind of problems?

Use of Network

1. Who used the network?

2. When and how often did you access the network? What were the preferred times of use and why?

3. What are some of the reasons that you used the network?
   Did you have a specific question or were you exploring?
   If exploring, what was of most interest to you?

4. Prior to the network, where else would you go to get information?

5. What kind of information does the network give you that you would not have had otherwise?

6. What, if anything, did you do with information you obtained?

7. What kind of information did you seek that is not contained in the network?

8. Describe you experience using the network over these past 4 weeks?

   - Did you understand the purpose of the pilot?
   - Did you feel prepared to use the network?
   - What did you think of the training and materials? Any changes you recommend?
   - What changes in your proficiency and/or use of the network did you notice?
   - What were the obstacles/benefits to use?

Education Database

1. RBS developed a database for the purpose of this pilot with four sections: the resource directory, the calendar of events, the research directory, and successful practices in math and science. Which of these did you look at?

2. Did you return to any of these more than once? Why or why not?
   If more than once - how was (were) it useful?
   If not - changes recommended?

3. How easy or difficult was it to access, move around in, and exit this database? How "user-friendly" was this database?
   Use of descriptors
   Understanding and using the data structure
   Changes recommended?

4. What else would you like to see on-line?

Next Steps

1. What would you like to see happen next with technology use (at site)?

2. What plans do you have related to using the network?

3. What needs to be in place for practitioners to use a telecommunications network?

APPENDIX E

Interview Sites, Time On-Line, and Persons Interviewed

Interview Sites, Time On-Line, and Persons Interviewed

	Sites	Persons Interviewed
1.	Cape Henlopen High School DE Total Time: 29:37	Science teacher (Contact) Tenth grade student
2.	Montgomery County Intermediate Unit PA Total Time: 29:08	Technology services supervisor (Contact) Technology technical assistant High school librarian
3.	Mount St. Joseph Academy PA Total Time: 37:02	Technology coordinator and computer teacher (Contact) Foreign language Teacher and coordinator of staff development
4.	Parkview Elementary School NJ Total Time: 36:25	Computer specialist and gifted teacher (Contact) Resource teacher for special education Primary teacher for special education