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EDITORIAL

Distance education continues to provide solutions to educators worldwide faced with problems brought about by rural isolation, budgetary concerns, and availability of qualified instructors. Telecommunications technologies supporting a wide range of delivery methods allow educators in schools to explore new ways to enhance learning and deliver education.

This issue of DEOSNEWS presents the last in a series of papers presented at the "Best Practices in K-12 Distance Education" conference held at The Pennsylvania State University, April 13-14, 1997 (see file numbers 99-00003 and 99-00005 for other articles in this series). The papers highlighted in the current issue of DEOSNEWS focus on rural school districts and the solutions they have found to the education barriers occasioned by their relative isolation. Using different delivery methods, both have striven to expand opportunities afforded to students and those who serve them in rural U.S. counties through the use of distance education.

The first paper outlines the development of a school/community initiative to connect teachers, parents, and communities in a school district in Pennsylvania via a fiber optic network. The second presentation, set in South Carolina, describes how existing satellite and one-way video technologies available to schools in this state were used to provide education to students in one school district.

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PENNSYLVANIA INITIATIVE

KCNET: THE FIBER MODEL FOR RURAL CONNECTIVITY

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INTRODUCTION

Schools Today

The African adage, "It takes a whole village to raise a child," is rarely practiced by many communities today as it was in the past. Instead, many "one-stop" schools are trying to compensate for the social worker, the policeman, the nurse . . . and more. Educators are strained to fulfill the multiple roles required, and schools cannot afford the added staff and training needed for the growing list of

demands for services by students and parents. Education has lost its "staying power," with the Internet providing access to current information. Also, lifelong learning has become a necessity for professionals and skilled workers who need to maintain their competitive edge. Two-thirds of the present workforce will still be employed at the beginning of the next century, and a large percentage will require retraining.

Public schools will need to think intelligently about meeting both the educational and social needs of their community of learners. The Keystone Central School District (KCSD) in the state of Pennsylvania has chosen to meet these needs by establishing a networked, community-based learning environment.

The Role of Technology

Technology can transform teaching and learning. "To accomplish that job," says Dr. Linda Roberts, director of the Office of Educational Technology, U.S. Department of Education, "technology must be an integral part of your school or community's overall plan to move all children toward high academic standards." For students, the ability to use technology has come to be recognized as an indispensable skill. The Secretary's Commission on Achieving Necessary Skills (SCANS) stated this in the starkest terms: "Those unable to use [technology] face a lifetime of menial work" (Means 1993).

Successful adoption of educational technologies focuses on three primary concepts (Cassidy and Lane 1994):

- * The benefits of using technology will not be apparent in an educational organization until ALL students and teachers have equitable access to the technology.
- * Students learn by constructing their own knowledge and sharing that process with others in their classroom and across networks by instructors who have become effective facilitators of learning.
- * The combination of equitable and universal access, student construction of knowledge, and facilitative teaching will result in the transformation of learning and teaching.

Making the connection between technology, teachers, and parents is one of the most important steps we can take to make the most of past and continuing investments in educational technology. It is central to the ultimate goal fostered by these investments -- not just helping students become competent users of technology, but helping them become more accomplished learners.

For the community, access to the 'information highway' may prove to be less a question of privilege or position than one of the basic ability to function in a democratic society. It may determine how well-educated people are, the kind of job they eventually get, how they are re-trained if they lose their job, how much access they have to their government, and how they will learn about the critical issues affecting them and their country.

BACKGROUND

Our vision for schools and communities in the 21st century has a focus on credible solutions that share infrastructure, education, and services with the community. We have started to build a successful model of this vision in rural central Pennsylvania -- KCnet, The Keystone Community Network. KCnet is a non-profit organization linking an entire, very diverse community in northern central Pennsylvania with a 21st century telecommunications infrastructure. It is the product of a 1994-95 National Science Foundation Planning Grant received by Keystone Central School District to develop a network infrastructure, KCSDnet, linking its seventeen rural schools. The backbone fiber network, implemented by the school district and covering all of Clinton County, became the shared infrastructure for KCnet, which was incorporated on June 21, 1995.

KCnet holds the following as its vision:

"We believe that communication helps us to build alliances, partnerships and working relationships with diverse constituencies . . . and that with a collaborative effort, we can use these opportunities to establish a sense of community to reach mutually determined objectives and enable Education for Everyone, Everywhere, Everyday."

PLANNING AND IMPLEMENTATION

By sharing resources between the school district and the community, KCnet now provides more than 950 Internet access memberships to the residents of Clinton, Lycoming, Potter, and Centre counties at an affordable, sustainable rate of approximately \$10.00 per month. Keystone Central School District student accounts will soon be added to the more than 500 KCSD employee accounts. Computer labs in the schools have become public access sites for students and community members alike. A recent online survey was generated as a project by a sixth grade class in KCSD (<http://oak.kcsd.k12.pa.us/~survey>). The purpose of the survey was to determine the potential for community and education collaborations on "Projects for Mutual Benefit" (i.e., What are some ways we can work together to learn from each other and, in doing so, improve our community and our education?). The results of this survey will assist in the development of shared services between the school district and the community.

Clinton County has made a major leap into the information/communication age, one that can bring significant educational and economic benefits. Following the lead of the KCnet prototype in the Keystone district, similar "electronic communities" have been established with funding from Pennsylvania's Link To Learn initiative. This will provide more global networking, reaching people in other rural communities as well as a local community of services in the schools. These efforts will join people within a rural community and join the rural communities with the world.

Technical Issues

After a yearlong study comparing several models for connectivity over large geographic areas, the decision to implement full fiber connectivity throughout Keystone Central School District (and Clinton County) was made by KCSD in July 1996. At that time, KCSD was running relay lines to five of its schools and a compressed video line to the network center, with Internet service provided through three networks. There were more than 300 telephone lines installed in the district (including foreign exchange lines) with service from three telephone companies, which included long-distance charges between KCSD schools.

As more and more computers were connected, network access to computers in the labs began to slow down, and expensive classroom equipment to provide compressed video was needed at every rural site so students could take part in distance learning courses. Additionally, with connectivity at the schools increasing, more network servers at each site in the district were needed. This, in turn, required an increase in the number of staff to maintain servers, network, and compressed video equipment.

Thus the decision to implement the fiber network with voice/data/video made sense for this large rural area. With the TCI (Tele-Communications, Inc.) fiber network, KCSD virtually created a 1,000 square mile local area network (LAN). Fewer servers are required because they can be centrally located at the network center. Satellite downloads can be shared with every site over the high-speed fiber. Full-motion, continuous-presence video is available in every classroom using affordable camera equipment that can be plugged into existing television cable outlets. Voice traffic is carried over the fiber network, thereby eliminating more than half of the telephone lines and accompanying long distance charges; this alone will pay for approximately one-half of the monthly fiber rental.

Sustainability

Members of the Consortium realize that this network is only affordable if certain tradeoffs are made:

- * With the high-speeds available on this fiber backbone, central location of equipment means less equipment to purchase, load, back-up, and maintain.
- * High quality, full-motion, continuous-presence video is available with portable camera equipment that attaches to the existing television cable feed in every classroom. High-cost, compressed video equipment is not needed at each site; a single codec can be scheduled to serve a widespread area when needed to link with other compressed video sites.
- * Telephone services are available over the fiber backbone to every site without inter-latta charges. In addition, the elimination of nearly one-half of the phone lines in the district shows a realizable cost justification over the short- and long-term.
- * Sharing the fiber backbone with the community through attachment of local business and health care agencies can mean a lower rate for the educational institutions that make the initial contract. KCSD will realize a decrease in monthly fees at each site as new agencies attach to their network to share costs.

Finally, as educators begin to realize the full potential of the voice/data/video network that is being implemented at their schools, they will begin to use these tools to replace conventional "chalk and books." Therefore, their own general fund budget for curriculum items can be reorganized and directed to pay for these new instructional technologies.

FUTURE PLANS: PARTNERSHIP EVOLUTION

As the KCnet Consortium is strengthened by the sharing of more and more resources, this rural partnership is evolving into a transparent (virtual) classroom (community) that is empowered by its ability to readily access current information for cooperative learning and decision-making. It is becoming the norm for classrooms throughout KCSD to use video to link with other sites anywhere in the district, sharing a lesson or working on projects together. Inter-district Spelling Bees, Science Fair Project Judging, and Debates are some of the ways schools have begun to work together. Likewise, the community now has access to the video centers for continuing education, and some programming will even be available over the public access channel in homes.

REFERENCES

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SOUTH CAROLINA - DISTANCE LEARNING PROJECTS

DISTANCE LEARNING, OUR SOLUTION

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BACKGROUND

The purpose of distance learning at Branchville High School is to offer a more rigorous curriculum for the student wishing to continue a post secondary education. As late as 1988, students at the small rural high school in South Carolina were limited to taking only the basic courses outlined in the state's Defined Minimum Program. The core curriculum, including the electives, provided only the units needed for a diploma. For example, Spanish was the only foreign language and Algebra I and II were the highest levels of mathematics offered. Finances did not allow for expansion of the curriculum using the conventional method of hiring additional teachers. If the students at Branchville High School were to receive a more rigorous curriculum offering, it would have to be other than the conventional. Distance learning proved to be the solution to this problem.

In 1983, it was determined that if Branchville High School students were going to be competitive with their peers from larger high schools, the curriculum must be expanded. After several years of searching for a solution that would be within financial reach of the small school district, distance learning was discovered. It was the only financially practical solution to the dilemma for a school with 160 students in grades nine through twelve. The decision was made to offer academic and college preparatory courses. Courses in science and mathematics requiring special transmitting equipment for individual students are limited to an enrollment of twelve.

By joining the Satellite Education Resources Consortium (SERC) during the 1989-1990 school year, Branchville High School expanded the curriculum with nine electives: Russian I and II, Japanese I and II, Probability and Statistics, Discrete Mathematics, Physics, Advanced Placement Economics, and World Geography Honors.

The technology chosen for delivery of the courses was Direct Broadcast Satellite (DBS), which provides one-way video programming transmitted by satellite with two-way audio interaction via telephone. Branchville uses a fax machine to receive and send tests and other materials back and forth from the transmission site. Although a teacher is not required to be present in a classroom during instruction, a facilitator is needed for supervising the students, even though only one student may be enrolled in the course.

IMPLEMENTATION AND PLANNING

Barriers

While distance learning was the most practical solution to Branchville's problem, it also presented barriers that had to be overcome. The initial cost of the equipment and the establishment of the classroom seemed to prohibit immediate implementation. Developing a partnership with South Carolina Educational Television Network reduced this problem tremendously. They provided Branchville with the basic equipment at a fifty-fifty matching cost. Other expenses had to be considered, as well. The tuition of four hundred dollars per student presents a continuing expense to the district. Although the classes do not require the employment of certified teachers, they do require that an adult facilitator be in the classroom at all times. When the facilitator is absent, a trained substitute must be present. Space for the class also presented a problem. A room large enough to hold the equipment as well as twelve students is needed, and it must be a secure location protected from vandalism or theft. Additionally, a great deal of money has gone into equipment used for only one

purpose as well as a limited number of students. Special equipment had to be purchased for the maximum number of students; however, in a school the size of Branchville, the class has only reached the maximum of twelve students once in eight years. The equipment is idle the majority of the school day.

After conquering the major barriers, several routine problems required attention. For example, the broadcast does not coincide with the school's class or bell schedule and usually overlaps the school's class periods. The students taking distance learning courses either come to school early, stay late, or take the course during the lunch break. Since our district calendar does not match that of SERC, some distance learning courses cannot accommodate live interaction; the same problem exists when a student is absent. Further, the facilitator, a non-certified teacher in the area, cannot provide academic assistance to the students. The most serious problem that has no immediate or simple solution, however, is a mechanical failure of the equipment. The solution, having two of everything, is a costly one that Branchville has been unable to afford. The most immediate problem at Branchville is having the personnel to devote full time to selling the program to both the students and parents. Finally, these course offerings only appeal to very few students.

Successes

Though many barriers and problems exist, distance learning has been a success from its inception. It does provide students the opportunity for a more rigorous course selection. Since offering the first SERC courses, Branchville has successfully expanded its distance learning program. The district joined the local South Carolina Educational Television Network (SC-ETV) Taping Center in nearby Blackville. The SC-ETV Network has twenty-one tape and delay centers located throughout the state. SC-ETV and local school districts jointly operate the tape and delay centers. Each center provides four channels of closed circuit broadcast capability to secondary schools in the local coverage area. These centers equip a complete video library of every instructional program or series approved by the State Department of Education for grades 7-12 and offered by SC-ETV. Today, these centers have become much more versatile. Low-cost, affordable technology makes it possible for these centers to become actual live, interactive video production facilities. In 1992, Branchville High School began receiving broadcasts from the Blackville Taping Center.

As a service to the larger high schools in our area, the University of South Carolina-Salkehatchie has taught World Civilization 101 and 102 on-site for college credit to high school seniors. The districts with smaller high schools did not have enough students to justify a professor's time for an on-site course. Consequently, the seven school districts associated with the Blackville Taping Center initiated short distance learning. Thus World Civilization 101 and 102 have been a part of each school's curriculum since 1993. The course is broadcast live from the Blackville Taping center. Students register with the University of South Carolina and pay tuition as though they were college freshmen, but at a special rate. The students are extremely interested in the college credit courses, and three more courses, English 101 and 102 and Math 111 - Basic College Mathematics, were added to the schedule in 1997-98.

LEARNING OUTCOMES

The purpose of the distance learning programs at Branchville High School is to expand the curriculum for the college-bound student. A formal research study has not been conducted due to the small number of students enrolled in the distance courses at Branchville. However, for purposes of encouraging students to enroll in these courses, an informal study of student SAT scores has been conducted. The SAT scores of students who took courses through distance learning and attend post secondary schools have been compared with students that did not take the courses but also attend a post secondary institution. The comparison reveals that students who took the courses scored an average of 51 points higher than those who did not take the courses did.

FUTURE PROJECTS

Additional benefits of distance learning at Branchville High School include an accelerated effort to incorporate other technology into the Branchville schools. The School Board of Trustees, recognizing that distance learning has expanded opportunities for students, has agreed to use building funds to network and place computers in the schools to provide access to the Internet -- four years earlier than originally planned. In addition to classroom instruction, distance learning can provide staff development programs, short courses on test preparation and study skills, GED training and testing, adult education classes, and health education updates.

The primary benefit of distance learning at Branchville High School is that it provides students with the opportunity for choice in an expanded curriculum beyond the Defined Minimum Program. Distance learning has been the springboard leading the Branchville Schools into the technological era. Future plans and goals are to include all students in distance learning and make it more appealing to all students. This will be accomplished by upgrading the equipment to take advantage of newer technology, such as Interactive Distance Learning (IDL) with two-way video capabilities. Technologies involving distance learning now provide a choice. The decision is which ones will be best for all students. The good news is that each day the issue of affordability is becoming less of a barrier to providing opportunities for students.

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