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ABSTRACT

This paper reports on how technology is currently used in nine schools that educators view as "promising" exemplars of technology use. Four elementary, three middle and two high schools from Arizona, California and Nevada (three schools from each state) were examined. Extensive document review and telephone interviews were conducted in preparation for two-person 1- to 2-day site visits. The schools implemented three types of technology: voice (internal/external telephone system with voice mail and electronic access to engage other technologies), video (within and between classes) and data (computers with electronic mail). The video category includes video cameras and computers for editing video productions, as well as television monitors, video cassette recorders (VCRs), and cable; the data category includes computers with Compact Disk-Read Only Memory (CD-ROM) and laser disc capability, scanners and Internet access. Access to computer equipment was an issue at all schools. All but one school had at least one computer in every classroom; special education classrooms typically had computers for each student. Staff training and support depended on technology types, schools' equipment and availability of training personnel, the purposes and manner for which technology was going to be used, and the breadth and level of technology skills already held by the teachers. In terms of program development, four issues were encountered by the sites: community support, finances, facilities, and educational philosophies. Each issue was encountered during different steps of program development: planning, implementation, maintenance and expansion. All of the schools are striving to keep up with technology. Unfortunately, needs and demands for technology are outpacing the funding potential. Contains seven references. (AEF)

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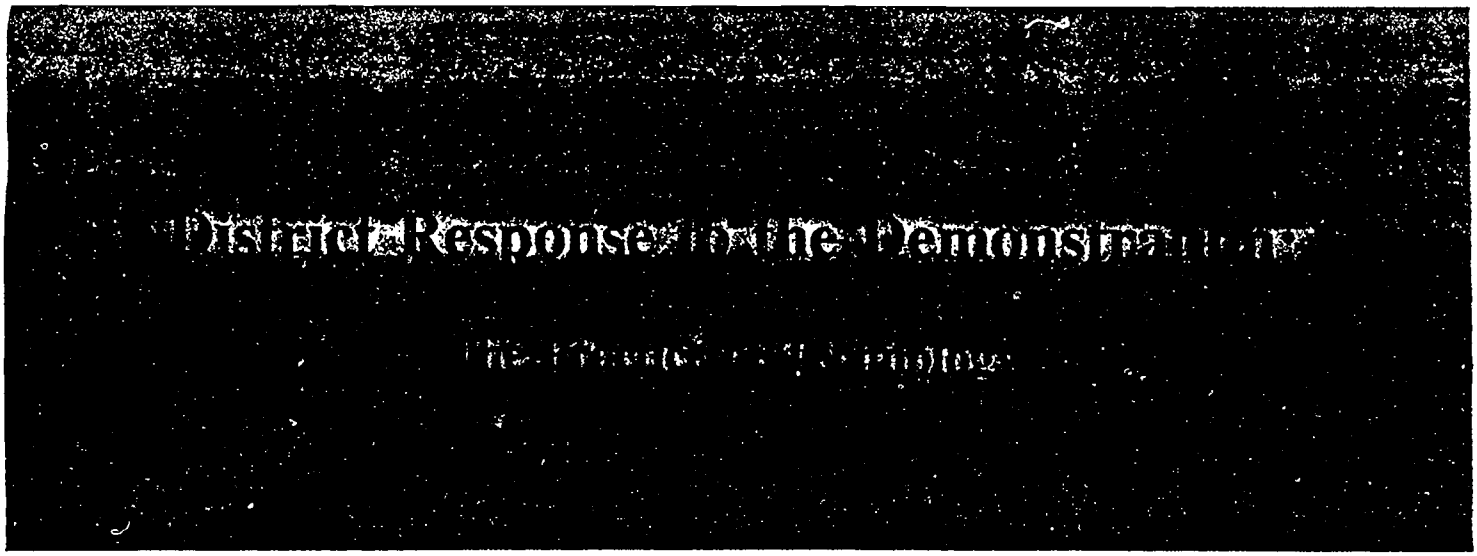

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Contents

Abstract

This paper reports on how technology currently is used in schools that educators view as "promising" exemplars of technology use. It contains descriptions of a variety of technologies and examines the strengths and weaknesses of their application in schools. The paper highlights issues related to educational uses of technology. It concludes by raising questions relevant to technology use.

Four issues were encountered by the sites as they began moving through the process of bringing technology into the schools: community support, finances, facilities, and educational philosophies. The manner in which these issues were dealt with is discussed. Each was encountered during different stages of program development: planning, implementation, maintenance, and expansion.

Introduction

Technology is a cross-cutting educational reform tool, with the potential to provide instructional opportunities previously unavailable and to expand the knowledge and learning experiences of both teachers and students (O'Connor, 1992; Polin, 1991). Its many aspects and dimensions hold great potential to advance current educational improvement agendas.

However, successful implementation of technology-oriented classroom practices relies on their acceptance and use by classroom teachers. Such acceptance cannot result from legislation and policy alone; technology must become part of teachers' classroom experiences.

Technology can play an integral role in classroom management and organization (Collins, 1991; Herman, Heath, Valdés, & Brooks, 1991), be incorporated as a tool in the instructional process (Becker, 1990), or become the core of curriculum (Sheingold, 1991). As availability and use of technology continue to increase, its importance in the classroom and the educational environment may enhance the impact of many change efforts.

This paper reports on how technology currently is used in schools that educators view as "promising" exemplars of technology use. It contains descriptions of a variety of technologies and examines the strengths and weaknesses of their application in schools. The paper highlights issues related to educational uses of technology. It concludes by raising questions relevant to technology use.

Methodology

This paper is based on extensive information obtained from nine schools that are considered exemplary in their use of technology three each from Arizona, California, and Nevada. The Southwest Regional Laboratory (SWRL) asked the heads of technology education in each state department of education to recommend schools that were well-known in the state for their use of technology, and to provide SWRL with names of key individuals to contact at each site. On the basis of preliminary interview information, we then selected a mix of schools representing a variety of technologies, length of time technology had been used, and grade levels being served.

Of the final group, four are elementary schools, three are middle schools, and two are high schools. One of the two high schools is a newly built technology magnet school. The other high school is located in a small district, so we visited the elementary and middle schools there as well to observe the spread of technology throughout the district. Finally, three of the schools are in the first year of their technology programs.

Extensive document review and telephone interviews were conducted in preparation for two-person one to two-day site visits. Site visit activities included interviews with faculty and school and district administrators, and observations of technology use.

Although the sample schools are obviously not representative of technology use in the general population of schools, having been specifically selected for their outstanding efforts in this regard, their experiences can provide insights and lessons for all schools.

What Kinds of Technology Are Being Used?

The schools we visited implemented three types of technology: voice (internal/external telephone system with voice mail and electronic access to engage other technologies), video (within classes and between classes), and data (computers with electronic mail [e-mail]). The video category includes video equipment such as video cameras and computers for editing video productions, as well as television monitors, VCRs, and cable. The data category includes computers with CD-ROM and laser disc capability, scanners, and Internet access. However, not all nine schools necessarily had aspired to including the full mix. In the following section, each type of technology is discussed.

Voice

A voice system includes telephones in classrooms. Although telephones are among the oldest technologies, it is still uncommon for schools to have this basic form of communication technology in their classrooms.

Telephone systems were used in different ways in the schools we visited. Some of them only had an internal telephone system that operated much like an intercom system with a telephone receiver. Teachers were able to contact the office and other classrooms, but not the outside world. One school had an *internal* voice mail system that allowed school staff to leave messages for one another.

Some schools had telephone systems that were not only useful internally, but externally as well. About half of the nine schools had external telephone lines and voice mail. At one school, discussions were taking place regarding installing a system that would enable teachers to leave messages for parents. For example, a teacher could leave a message on the system at any time for the parents of his or her entire class, and the message could be programmed to be simultaneously sent to all of the parents around the dinner hour.

Voice mail has made a tremendous difference in the professional lives of teachers. They are able to contact parents, and parents can leave messages for them. As a result, there are no longer enormous delays in parent-teacher communication. A teacher in one of the schools with voice mail stated that she is able to work much more effectively with parents because of this mutual access. "Conversations can occur through messages," this teacher said. "They contact me in the evening, and I call them back on my lunch hour."

Additionally, teachers are able to deal with people outside the school community more immediately. For example, in establishing our site visit schedules, we did not need to leave a series of messages for teachers at main offices, and teachers did not complain that they were unable to access a telephone. Often, in studies, it takes many messages and many days before we hear

from a teacher. Outside telephone lines also enabled the use of modems, which we will discuss later.

Video

Four schools used video systems. Two middle schools and a high school used video systems for morning announcements. A typical scenario was that a group of students worked together to create a morning news broadcast. Students operated the camera and video equipment, and other students served as news reporters on camera reading the morning announcements. Two schools have the same group of students, such as student council members, doing the morning broadcasts all year long. The other two schools encourage all students in the school with an interest in being involved as either an announcer or video equipment operator to participate.

Two of the schools encouraged students to take the video equipment onto the school campus to design their own news stories. For example, students would film portions of sports games or assemblies and share them during the morning announcements as "school news." Occasionally, equipment would be taken off campus to film "community news" for special events. All of the news reports were human interest stories. One assistant principal said, "We keep our stories positive, interesting, and clean. We keep the blood out of our news."

One elementary school also used video equipment for special news stories. Gifted and Talented Education (GATE) and other high achieving students took an elective focusing on video production.

In those schools using technology for announcements and news stories, all classrooms typically had television monitors on which to view them. Announcements were produced live at a particular time in the morning, and they could be viewed from classrooms. Two schools rebroadcast the announcements periodically during the day on a particular channel so students and teachers could tune in to the announcements at any time.

All of the schools that had television monitors in the classrooms also had access to VCRs. However, the VCRs were not always in the classrooms. Two of the schools decided that not all of the teachers needed VCRs at the same time, but they wanted to eliminate having to move equipment around. The schools set up 8 to 10 VCRs in the media center, and teachers could access them from their classrooms. A media center/technology specialist at both schools took care of all of the video and data needs in the library. The specialist made sure that a videotape was in a VCR at the time the teacher needed it made available, and the teacher could operate the VCR from his or her classroom telephone keypad.

Data

Computers were set up in computer laboratories and in individual classrooms. Most of the schools we visited had computers in the classroom, varying in number from one to six. Students used them during class for reports and instructional programs. Computers in the classroom were primarily used by teachers to record, compile, and report grades. Teachers and administrators with access to the Internet also could send and retrieve e-mail messages. One principal said that he had not sent a paper memo for two years, only using e-mail to teachers and administrators in other schools and the district office.

All of the schools had computer labs. They were sometimes run by a specialized computer teacher, while others were available for teachers to take their own classes to the laboratory to work on class projects. Usually, students were able to access computer laboratories outside of class time. Two of the schools had laboratories available for teacher training, although students could use those facilities at other times. Other schools that provided teacher training used students' laboratories for that purpose.

Six of the nine schools used Macintosh computers, two schools (both high schools) used both Macintosh computers and IBM-compatible personal computers, and one elementary school used IBM computers. Some schools had computers donated to them, while others chose the type of computer they preferred when purchasing them.

About half of the schools had access to CD ROMs, laser discs, or the Internet. All of the schools want to be able to access the Internet as soon as possible. The schools that already were using the Internet provided access to students in different ways. Some provided access in the media center or computer lab, while others could access the Internet from the classrooms. Typically, only 5 to 10 computers in the school could access the Internet due to a lack of telephone line access for modems.

One school had set up a server that allowed Internet access to teachers only from anywhere in the school. However, only a limited number of hours per month were available for this purpose, and they were quickly used up. Another school had internal e-mail, but was working on gaining access to the Internet. Another school had exceptional Internet access. The U.S. Department of Defense's Lawrence Livermore Laboratory has been working extensively with the school, and provided Internet capability to every computer in the school's computer laboratory. The Laboratory is using the school as a test site for video conferencing and plans to support use of computer applications that allow students to interact live with the Livermore Laboratory scientists while working on the computer.

Access to Technology

Access to computer equipment was an issue at all schools. In schools with computer laboratories, students were typically able to use computers outside of class time for reports and special projects. In some schools we visited, computers were available to students at any time there was not a class in session. In fact, one school allowed students access to computers while classes were being conducted, if there were an available computer.

All but one school had at least one computer in every classroom, which made it easier to access for instruction, but not for independent student use. The magnet school did not have problems accessing computers in the classroom because some classrooms had a computer for every student.

Special education classrooms in the schools we visited typically had computers for each student. Students in these classes worked on the computers both with the teacher and independently.

Training and Support

Staff training and support are critical dimensions of an effective technology program at all stages of implementation and operation. The type, level, and location of initial and subsequent training activities at the schools we visited were dependent on the following factors:

- the type of technology being introduced;
- the manner in which technology was being introduced to the school (as a full package or with elements being gradually integrated over time);
- the manner in which teachers were expected to use technology (in their classrooms, in special computer laboratories, or both);
- whether the school had a technology specialist available to train and troubleshoot during the school year;
- whether the school had a laboratory that could be used for staff training purposes;
- the technology that would be available in individual classrooms;
- the purposes for which technology was initially going to be used (i.e., teaching computer and other technologic skills, enhancing instruction in all areas, or improving administrative functions—e.g., grading, scheduling, between-staff communications);
- if a particular school or district had a computer laboratory dedicated to staff and faculty development; and
- the breadth and level of technology skills already held by the teachers.

Each of the above factors help determine overall staff training needs and approaches to meeting them. For example, two schools had dedicated teacher laboratories, in which both large- and small-group training and individual practice (with assistance on call) could take place. Another school installed computers in each of several class preparation rooms for small-group sessions.

Two schools provided individual teachers with one free class period per day so they could serve as technology support personnel. In one of those schools, the teachers had been extensively trained, so this time was sufficient. At the other school, training had been less intense and needs were greater. Because the support person was able to respond to only very few, typically urgent, requests for assistance, an approach through which he could meet the broader needs of the entire staff was needed. In response, one hour of every other week was dedicated to schoolwide technology development, and attendance at training sessions comprised of equal parts of didactic instruction and laboratory practice was required of all faculty. These sessions were scheduled weekly during regular school hours, and the student school day was reduced.

The technology magnet school provided teachers with 500 hours of training and had several technology specialists among the school's teachers, who were able to provide ample assistance to their colleagues during the school year. At the other end of the training and support spectrum, one school did not even have a release time technology specialist who could work with the teachers. As a result, that school relied on district technology personnel for training on an "as needed" basis, and the staff used each other *and students* as resources to help them learn new techniques and to resolve computer "glitches" during the school day.

The development of a broad-based, in-house cadre of experts in this school reflected the principal's philosophy of encouraging teachers and students to become increasingly expert until some of them could be termed "sophisticates" in at least one area of technology—for example, a certain software program or application, the assemblage of computer work stations, Internet, and e-mail. These people were then included on a schoolwide list, along with their areas and levels of expertise, so that teachers knew whom to contact when they needed assistance.

Technical support personnel were lauded for their ability to save teachers from what they saw as the brink of disaster when technology went awry while being used in classrooms. However valuable, technical support personnel were limited in the type of help they could provide to teachers. While they knew basic software programs and could fix hardware problems, they were spread too thin to provide what one of them referred to as "the constant need for help from all corners of the school building." They also were more oriented toward technology *per se* than its integration into instruction. Given the tremendous rate at which educational software is becoming available, technology specialists have found it impossible to respond to teachers' requests for "the latest CD-ROM on some aspect of history."

Also, some technology specialists seemed to lose sight of their clientele, creating challenges and work demands that were beyond those required by teachers at the current stage of the district's technology plan. The specialists were researching subsequent generations of hardware, exploring the use of scanning machines, hypercard, compressed data, and so forth—all important and viable concerns. However. some teachers were still in need of further review concerning how to program a VCR and how to deal with computer crashes.

Program Development Issues

Four issues were encountered by the sites as they began moving through the process of bringing technology into the schools: community support, finances, facilities, and educational philosophies. The manner in which these issues were dealt with is discussed below. Each was encountered during different stages of program development: planning, implementation, maintenance, and expansion. Befitting their designation as "promising," all of the schools had progressed well beyond the planning stage. However, people at the sites we visited recounted the challenges and successes of their early endeavors.

Community Support

At each site, the people who originally determined a need for technology stated that it was critical for them to engage the interest of a broad spectrum of potential stakeholders. School and district personnel recounted their attempts to enlist the support of other faculty, staff, and administrators, as well as the school board and a wide range of community representatives. By including as broad a group as possible in early discussions, communities were able realistically to define the needs, available resources, and potential responses to meeting technology needs.

Meetings with community leaders and open, "town hall" meetings provided opportunities to detail the potential uses of technology. Such platforms also provided opportunities to discuss the benefits of having students and graduates in the community who are well-versed in technology.

On a more personal level, proponents from certain schools demonstrated to community members how they could directly reap benefits from the schools' technology expansion by taking advantage of facilities, training programs, and technical assistance that would be made available to the community. One school's technology laboratory was open to both students and community members at night and on Saturdays. According to site administrators, some small business owners came regularly to update inventory and financial records. Other community members came to learn new skills, keep up with their children, or, like some students, to play computer games.

However, even when champions of the technology concept were plentiful and earnest, site personnel reported facing early (and in some instances, continuing) financial, structural, and philosophical obstacles. Major issues were reflected in questions such as: What are the educational advantages and disadvantages of bringing technology into the schools? How much and what types of technology are necessary? How and where can this concept be physically carried out? Where are the resources to support such an activity going to come from?

Similar questions were addressed in various ways by the schools and districts involved, and the process of doing so often took a great deal of time. Planning periods prior to site

implementation ranged from one to four years. The time frames required depended upon several factors:

- the extent and complexity of the proposed activity;
- the extent to which the school or district already had been involved with technology; and
- the extent to which planning and implementation needed to be integrated with resource identification and/or development, current building plans, and educational reform efforts.

Finances

By all accounts, the largest obstacle that needed to be overcome in the planning stage was financing—identifying and acquiring resources for financing the technology effort. Costs for technology implementation at even modest levels typically far exceed general operating budgets, and sources through which to obtain financing for this purpose are limited.

The most common method for procuring technology funds among schools was gaining voter approval to float local school bonds, an action taken by four of the nine schools. For three schools, most of the bond money was for the construction of a new school, and specific amounts were targeted for ensuring that the schools' design and construction included advanced technology considerations. The fourth bond fund was used for constructing a technology wing as part of an existing school.

Two of the schools enhanced their technology capabilities through the use of district funds allocated for that purpose. The remaining three schools obtained their primary start-up funds from different sources. One received a multiyear state grant; one used furniture allotment money to buy computers; and one began introducing computers to the school in special education and vocational education classrooms by tapping federal appropriations that could be so used. All schools leveraged some funds from other sources as well.

Financial obstacles did not disappear once the programs were planned and implemented, as there was an ongoing need to maintain and sustain the programs. As the schools experienced inevitable staff turnover, new teachers required training to bring them to the level of technology use as those they were replacing. Otherwise, courses involved with cooperative instruction or school reform progresses in general could be adversely affected. At the same time, continuing teachers required additional training to:

- remain current with technological advancements;
- learn new strategies for more fully integrating technology into their curriculum development and instructional efforts·

- assume more troubleshooting duties in the classroom (both hardware and software problems); and

- attend to the increasingly sophisticated technology needs of students.

Added to those demands on maturing programs were those of upgrading and adding software packages, upgrading and adding equipment to accommodate new software requirements, retaining technical personnel who are in demand by business and industry, and often creating more space for computer/technology laboratories as student demands on work stations grew in response to increasing numbers of assignments requiring technology use.

It is clear that technology is costly. Schools just beginning to use technology without having paid gradual attention to it over the years may find the associated costs staggering, as it was the case with many of the schools visited. A common scenario was that community members, school boards, and businesses who were willing to support a new technological adventure were not as easily convinced of the need for what they perceived should be minor operational funding. Even in those communities where the continuing need for funding was acknowledged, economic times had changed, so enough votes could not be garnered to provide the funds. One principal said, "Our honeymoon with technology funding is over, for all intents and purposes." To paraphrase several of her counterparts, "There is no way this community is going to approve another school bond" for any purpose. Many respondents gave examples of bond issues being turned down by large margins in neighboring towns.

One of the district technology coordinators said, "(Community members) see the new school and the technology equipment during open houses or when they come to use the technology center, and they are so impressed that they cannot understand why we would need more of anything." Another hurdle reportedly faced by principals are school board and other community members who cannot understand "why test scores haven't gone up" after such large expenditures. "When we cannot answer that question to their satisfaction, and we are asking for even more money, it's a losing battle," said one principal. All of the schools are looking for grant money to assist them with technology maintenance and expansion, but none yet have been successful.

Arizona has a law precluding schools from incurring debt beyond a certain limit. Two of the Arizona schools we visited reported that their districts would surpass that limitation if they sold the bonds necessary to maintain and expand their technology programs.

Obviously, these financial condition reports do not bode well for technology use. Its impact on one school is as follows. Less than 40% of the school's current teachers were among those who had been hand picked and specially trained when its technology effort was initiated five years previously. Because there is no technology specialist at that school, much of the subsequent training for their replacements has been available on only a haphazard or "ask another teacher" basis.

A lack of money for new technology software and hardware is in some ways even more harmful to technology efforts than a reduction in new teacher training. In such instances, even those teachers who have been trained cannot move further ahead. As one technology specialist said, "The more teachers learn (about technology), the more they require of the software, the hardware, and me." Added another, "The more sophisticated students become, the more they demand of their teachers. And the teachers then turn to me."

Given their general inability to attract sufficient funds to maintain programs, those districts that planned to expand the technology are revising plans. The plans originally were to take one or both of the following directions: (a) an expansion within a particular school of either the types of technology being used or the extent to which current technologies were being used at that site; (b) or the expansion of technology, or certain components, from an originating school to other schools in the district. Where technology had been introduced to a district at the elementary or middle school levels, the inability to expand to subsequent levels has left students with skills they cannot use at school and certain expectations of the schooling process that cannot be met.

Facilities

Issues surrounding facilities and finances were inextricably intertwined at the sites. In five cases, the amount of money available dictated the type and extent of remodeling, rewiring, and other preparation work that could be done. In the other four, the projected costs of building a new facility that could accommodate the latest in technology and a variety of uses dictated the size of school bonds that were issued for that purpose.

Interplay of facilities and finance was exemplified in one of the districts that decided to begin construction of a new school. However, the existing facility was rewired to accommodate technology, as only a stop-gap measure. The new school is scheduled to open next year, two years after these decisions were made. Had that community waited two years to introduce technology, teachers and students would not be as far along as they are today. Building planners also had an opportunity to incorporate in their designs the additional learning and practical suggestions of teachers who were using technology.

Construction of a new school provides an opportunity to accommodate the type of infrastructure necessary to support cutting-edge technology. Remodeling, rewiring, and modest construction can only provide some of the same benefits. However, regardless of the context within which technology is to be accommodated, the architects and builders involved must be familiar with technology in general, and especially with its special requirements for educational applications—for example, concentrated user areas, integrated systems, and communications. One school's remodeling efforts were thwarted time and time again by architectural omissions and builder miscalculations and mistakes. Construction problems included the lack of a power source

for the main computer hub, the installation of only two electrical outlets in classrooms housing more than 20 computers, and the creation of extremely unsafe electromagnetic fields.

An important facility-related issue is the number of computer laboratories and other technology intensive locations to be housed. Although all of the site visit schools had at least one laboratory (including two that had a separate laboratory for teacher training and class preparation use), their number and size were determined by the manner in which technology was anticipated to be used in the schools. At some, laboratories were to be used primarily for teaching computer courses to students and teachers; at others, it was anticipated that teachers would bring their classes to laboratories when they needed the technology that could be provided there.

In operation, and within the constraints mandated by number and size, this issue ended up being more teacher-dependent than facility-dependent. Because it was rare that regular classrooms housed enough computers for all students, teachers who were making the most use of technology typically needed to sign their classes up for laboratory time well in advance. This became an important access issue for both students and teachers at all but the magnet school site. At two of the sites, additional laboratories already had been constructed by the time of our visit; at two others, those originally intended exclusively for teachers ended up being shared for classroom instruction and homework assignments.

One school has experienced no problems in this area. Not only can multiple classes be held in its 8,000 square foot laboratory, but dozens of students and teachers can be working independently at the same time. Anticipating this demand while trying to moderate personnel costs, the laboratory was constructed in such a way that one person can oversee the entire spectrum of activity from a "command desk."

Educational Philosophies

Philosophical differences shaped discussions and decisions regarding community support, finances, and facilities. Several negative "camps" were recalled by school and district personnel. At one location, the community's immediate and general response was that they "will do anything to help the kids." However, over the next few weeks, a growing splinter group began reflecting on how well former students (including themselves) had done in the past, and began asking, "Why is all this needed?"

Community members in another town asked for prior assurances that standardized test scores would improve, and were disappointed when educational leaders could not provide them with such guarantees. Still others were afraid that "all this new technology will take our kids away from here when they graduate." The word "newfangled" was disparagingly used in reference to technology across a wide range of settings.

Reluctance to technology was not only found among community members, however. Educators also had (and in some cases still have) their own contingency of technology naysayers.

Although they were reportedly a minority presence in the initial discussions at all of the schools, they still conveyed a wide range of concerns. For example, some teachers were unable to see the relationship of technology to their subjects and classrooms. Others did not understand "why a whole school should be changed for a couple of vocational courses."

There also were teachers who were simply unsure about, uncomfortable around, and afraid of technology, much less the idea of having to learn the new skills. Some proponents had assumed that any teacher resistance encountered would come from among the more seasoned teachers. However, within the schools we visited, there were reportedly no differences evident between those new to teaching and those more experienced. In fact, three principals reported how the introduction of technology had reinvigorated some "burnt out" teachers who saw it as a new challenge.

On the other hand, some of the newer teachers felt that they had enough to deal with. Given the fact that most teacher training institutions do not provide more than minimal exposure to and experience with technology as a instructional tool (U.S. Congress, Office of Technology Assessment, 1995), some of the newer teachers did not want to learn this skill on the job. Some teachers felt that technology would minimize teacher-student interactions and remove the personal aspects and rewards of teaching. Some community members felt the same way and were reportedly also concerned that teachers might be replaced by the new technology. Still other teachers, and community members as well, had been disappointed by previous new technologies that were to have revolutionized teaching and learning—for example, radio and television—and were in no hurry to again fall victim to what they thought could be another false hope.

All of the schools are either planning or already have begun to introduce Internet use and control at the student level. This is raising some concerns about the legal issues involved in schools providing unlimited access to public information networks by youth. At the magnet school in our sample, there is only one Internet connection at the school, located in the library, and students are allowed limited access through their teachers' accounts. This shields students form inappropriate material, such as pornography or hate literature.

The magnet school currently is teaching students acceptable user guidelines within the context of social ethics in an attempt to address issues raised by Internet access. The district also has formed a committee to develop policy guidelines around the degree of student access to the Internet. This issue also was addressed at other schools, as schools are eager to include the Internet among their instructional support capabilities.

What Happens Next?

Schools' future plans differ depending on their needs and how far they have progressed toward their long-range plans. Generally, their plans involve staying current with new technology, scaling up, and seeking money to further their technology programs.

Whether schools are trying to scale up or stay current, their most critical need is resources. Technology is very expensive to keep up. As discussed previously, newer educational software requires more disk space and more memory than present machines can handle. Because "today's best is tomorrow's obsolete," school personnel recommend that when starting a technology program, schools should buy the best equipment they can at the time, and make sure what is purchased can be upgraded.

Computer repair support is important to maintaining a technology program. For example, two schools determined that the extent of repairs was so great that their districts are planning to hire people to repair all district computers.

Technology has led schools to plan new courses for students. For example, one school is starting an information retrieval course for eighth graders. Another school is reaching for Internet access, and still another is keeping a laser disc/CD resource library current for the district.

One district is planning to provide *one* type of technology (voice, video, or data) to each school in the district. Each school can choose the type of technology it would like to receive because there is not enough money for each school in the district to receive all three. Yet another district will provide no more keyboarding courses beyond the middle school level, as students will be assumed to already have acquired that skill.

All but one of the schools are seeking funds for technology. They are writing grants, and asking parents and members of the business community for donations. Most of them are not just looking for money, but equipment as well.

All of the schools are striving to keep up with technology. Unfortunately, needs and demands for technology are outpacing the funding potential.

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