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ACHIEVE!

An Update on Student Retention Issues

This newsletter, published periodically as part of the League's student retention study, provides information on various aspects of the dropout problem, legislative issues relating to the crisis, prevention programs, and ways to encourage student retention.

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TECHNOLOGY IN THE CLASSROOM

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This *Achieve!* is the first in a two-part series exploring educational technology. This issue examines technology's role in the schools, the workforce's dependence on technology, teacher training, and implementation concerns. A later *Achieve!* will examine Texas' efforts to integrate technology into its schools.

SUMMARY

The nation's classrooms must adapt to educate the future workforce. By the year 2000, the demand for a technically trained workforce is expected to increase by 36%, while the available pool of potential workers is decreasing (see *Achieve!,* October 1990). The resulting shortfall means that now, more than ever, it is imperative that the nation's schools provide young students with the skills needed to succeed in a technical society. **The traditional basic skills of "reading, 'riting, and 'rithmetic" will have to expand to include technical literacy, communication, and problem-solving as basic skills.**

New forms of educational technology have provided schools with additional means to teach students with different learning styles and to expand the instructional capabilities of teachers. A commitment to adequate teacher training and a holistic approach to implementation will aid in reducing the number of dropouts.

HISTORICAL PERSPECTIVE

The nature of the workforce has had significant historical influence on public school development. Mass manufacturing springing from the Industrial Revolution did not require a broad-based education, but depended instead on reliability, steadiness, and the ability to follow directions. "Taylorism," a production strategy, was developed to provide an efficient way to organize mass production with a large population of low-skilled workers. A small group of educated managers and planners handled the thinking for the organization.

The Taylor model's lasting influence on education is illustrated in the routinized, teacher-dominated, and fact-oriented schools that exist today. Instead of being taught to explore new directions, too many students are taught minimal skills. Educational institutions have been slow to adapt to the changes caused by society and technology. Schools must give

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students opportunities to "learn by doing," to analyze information, and to solve problems on their own.

The importance of technology in accomplishing these goals must not be ignored. The nation is now an information society and technology is an integral part of the population's daily lives and should be an integral part of the education system. Most efforts to date have focused on technology as a remediation tool or as a device for drill and practice. Instead of defining technology as another learning unit, schools need to fully integrate technology into classroom instruction to encourage technical literacy.

What is Educational Technology?

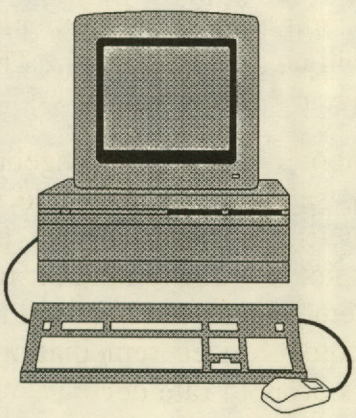
Educational technology in schools to most people will mean computer hardware, software, television, radio, or other technological tools. The Texas Advisory Committee on the Long-Range Plan for Technology defines the state's current educational technology to include computer hardware and software, interactive videodisc, and distance learning systems.

Other observers, such as former U.S. Secretary of Labor Ray Marshall, strongly believe it is dangerous to define educational technology as a "noun (physical thing) instead of as a verb (process)." **Educational technology is not simply a tool, but a process that involves the use of knowledge, skills, and instruments which provide the expertise necessary to solve complex problems and to develop human potential.**

Many of the difficulties that the education community has experienced in implementing educational technology stem from the definition of technology as a product rather than as a process. Most research on educational technology has centered on the number of computers and televisions available per student in schools as opposed to whether the technology was successfully implemented and used efficiently to positively affect students. Before technology is implemented in any educational environment, a more holistic approach, defining both systems and strategies for implementing the systems, must be developed.

What is Educational Technology's Role?

While the nation's schools are charged with youth education and dropout reduction, they must also provide students with the skills needed to compete and succeed in the 21st century and beyond. Technology must be included in all education plans if this goal is to be realized. According to research, educational technology fulfills these roles:



International Business Machines Corp. (IBM) is now "technically training" 22,000 of its employees somewhere in the world on any given day. IBM has been able to save between $200 million and $300 million a year by using self-paced instructional hardware instead of traditional instructor-led classrooms. More importantly, IBM has found that self-study students master lessons 25% faster and retain more material.

- provides a cost-effective method for delivering education to hard-to-serve populations -- the rural communities with limited resources, the handicapped, and the Limited-English-Proficient students;

- provides teachers with a means to expand their instructional capabilities;

FIGURE ONE

Technical Expansion

- Between 1983 and 1985, the number of computers in U.S. schools quadrupled from approximately 250,000 to over one million. This number more than doubled again by 1989 to total 2,335,000 computers.
- In 1985, 86% of the nation's schools had access to computers, with 24% having four or more computers. By 1989, 96% of schools had access to computers, with 57% having 15 or more computers.
- In 1980, very few public schools had videocassette recorders. Today, roughly 90% do.
- Over 12,000 public schools, 14.5%, have purchased modems.
- Currently, approximately 35 states are supporting distance learning programs, many of which use satellite technology to bring instruction to children in isolated areas.
- Roughly 2,336 public school districts, 16%, have purchased satellite dishes.

Source: Office of Technology Assessment and Fall 1990 Quality of Education Study

- offers students with different learning styles a tool that can be tailored to fit their educational needs; and
- equips students with the tools needed to participate in a rapidly expanding information society.

TECHNOLOGY AND THE AT-RISK STUDENT

The basic skills of those students at risk of dropping out have improved with an increase in the use of technology -- especially computers -- in dropout prevention, recovery, and remediation programs across the nation.

Computer-assisted instruction (CAI) is a proven supplement to traditional classroom teaching methods, especially for at-risk students. Elementary students, in particular, who used CAI gained the equivalent of one to eight months of instruction over peers who received only traditional instruction. Early attention must be given, however, to selecting software for CAI that assures a balance between "drill and practice" and higher-order thinking skills.

Technology gives at-risk students the opportunity to succeed privately and at their own pace. At a national conference on technology and at-risk students, practitioners agreed that technology benefits this population the most because it gives them a feeling of self-efficacy and control over their own learning pace. The computer forces students to think because it will not think for them. They have to get the answer right to continue.

One school district in Orangeburg, South Carolina has successfully integrated technology into the curriculum for its at-risk population. All students not meeting minimum standards on state achievement tests are required to enroll in the state's computerized remediation program. The district's dropout rate decreased from 8.6% to 2.5%. In addition, 68% to 70% of the

students are meeting the standards of the state's skills test. Previously, only 40% had mastered the skills needed to pass.

Alternative Learning Styles and Technology

Research has shown that all students do not learn in the same manner. The Center for Slower Learners has reported:

- "30% of all students are auditory learners (they remember 75% of what they hear),
- 40% are visual learners (they remember 75% of what they see), and
- 15% are tactile or kinesthetic learners (they remember 75% of what they learn by working with their hands or by being involved in real experience)."

More importantly, 88% of at-risk students learn tactically and kinesthetically. A learning style inventory, however, found that 85%-90% of teachers tested preferred learning visually. This mismatch can cause problems, for both the students and teachers, and generate frustration.

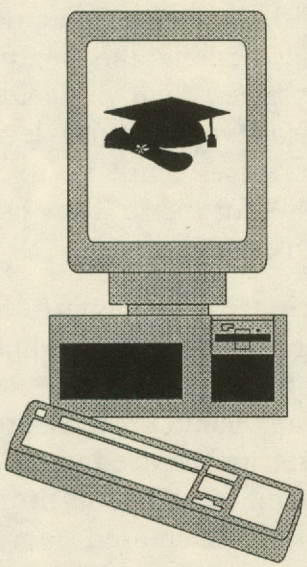
In addition, teaching through lectures has been shown to be a difficult way for 70% of students to learn. Tactile students will suffer the most. Several instructional strategies have been found to be successful in enhancing the learning of these tactile and kinesthetic learners. The use of educational technology is one of these strategies.

Teacher Training

Teacher training is critical because of the large capital investment required by schools to implement educational technology. A lack of commitment to ongoing teacher training will likely ensure that educational technology will be used superficially and the investment will be wasted.

In a 1988 study, the Congressional Office of Technology Assessment (OTA) stated that four interrelated conditions concerning training and support are necessary if technology is to be used effectively by teachers. OTA contends that teachers require:

- "training in the skills needed to work with technology;



An alternative school in Charlotte, N.C., the Media Technology Learning Center (MATEC), serves 54 of the 800 seventh graders enrolled in the local junior high school. MATEC students are selected for the program because they cannot succeed in the regular school setting. Their different learning styles are not accommodated in traditional classroom instruction. MATEC uses computers to give these students the individualized instruction that is needed for them to learn. Videodiscs are also used to supplement the MATEC pupil's study of math and science. When the students were given their first report cards this year, 72% made the school's A and B honor roll. Most MATEC students had not received grades this good since first or second grade.

- education that provides vision and understanding of the state-of-the-art developments and applications;
- support for experimentation; and
- perhaps, most valuable of all, time for learning and practice."

Although the acquisition of educational technology has increased phenomenally in schools over the past ten years (see Figure One), training for teachers has not. In fact, OTA found that teachers, among all their duties, feel least prepared to teach with computers (see Figure Two).

Teachers themselves have voiced a concern over the lack of training and the time for training. One teacher stated, "I think outside training is needed, but I don't think it should be rushed the way it was the first sessions we had...Don't give me two days of training, and then throw me on a computer. Teachers are upset...you're not familiar with computers and you are scared of them." **This skepticism and fear of technology by teachers and a lack of sufficient training -- not the large initial costs of technology -- may be the biggest roadblock to creating schools that educate students to be technically literate.**

This situation is not likely to change unless more training opportunities are made available to teachers. OTA reported that approximately 18 states required preservice technology training, seven states recommended training, and 24 states had no requirements or recommendations for training for their teachers. In addition, the number of states providing inservice training for teachers was much lower. Only three states required inservice technology training, 15 states recommended training, and 31 states did not require or recommend any training. Texas requires schools to provide preservice and inservice technology training for its teachers. However, teachers are not required to attend the inservice training on technology.

The Center for Educational Technology at the Bank Street College of Education in New York recently published a study on teachers who had successfully integrated educational technology into the curriculum. The study found that these teachers had adequate support from their administrations and sufficient access to technology. Furthermore, teachers felt comfortable with technology because of their experience and training and found that it took five to six years of teaching with technology before they felt they had mastered it. Regardless of this time commitment, the

The Business Community's Role

- The business community should work cooperatively with the educational community to inform them of the technical skills needed in the workforce.
- The technical expertise that businesses possess should be shared with the schools. For example, business members could make presentations to classes or aid in the technology training of teachers.
- The business community should play an advocacy role in ensuring that adequate opportunities to use technology are made available to both the teachers and the students.

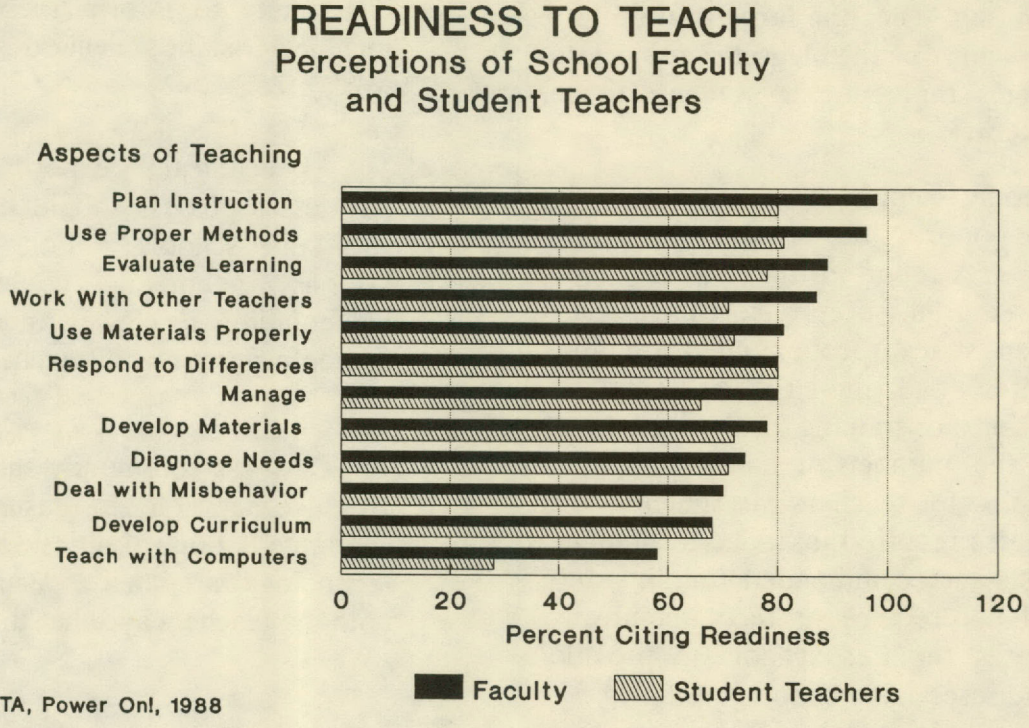
teachers agreed that technology has significantly improved their instruction and the achievement of their students.

CONCLUSIONS

The implementation of educational technology is a concern of both the business and education communities. The business community is seeking workers who are prepared for technical job demands and who possess higher-order thinking skills. Educational technology has been proven to provide new basic skills required of all students as well as offering an invaluable alternative learning strategy for at-risk students. When developing a technology plan, however, schools should consider the following:

- The implementation process should involve considerable planning at both the state and local level and should include input from both teachers and administrators.
- Goals and objectives should be established to clearly state the technology's effect on instruction and the curriculum.
- Resources need to be committed to ensure that adequate technology is fully integrated into the classroom. For example, the traditional computer lab is no longer sufficient if technology is to have an impact on instruction - technology needs to be a part of the classroom.
- Technological instruction will fail if ongoing training and support - separate from preservice and inservice training requirements - is not provided for teachers. Developers and marketers of software can lend their support by offering training and including teachers in the development process.

FIGURE TWO



SOURCE: OTA, Power On!, 1988

Innovations in Educational Technology

California's MTS Schools

In 1986, California's Educational Technology Committee (ETC), decided to establish the Model Technology Schools (MTS). By 1989, six sites had been selected consisting of a complex of between two and five schools for kindergarten through the twelfth grade. Each site's goal is to move classroom instruction away from formal teacher-centered textbook learning to student-centered informal learning. When first designing these schools, ETC moved away from the traditional computer lab. Each of the six sites in the districts feature schoolwide computer and video networks with from one to several computers and a large screen monitor in each classroom.

Distance Learning In Minnesota

The Minnesota State Board of Education in 1984 ruled that a distance learning program should offer many subjects that have low school enrollments and that are not offered in the small schools. Approximately 50 districts are now involved in a live two-way video and audio instruction project called the Technology Demonstration Program. A certified telecast teacher delivers from a production studio to the remote classrooms the course content, instruction, testing, and evaluation and performs all other instructional duties. Remote school districts, however, are responsible for providing a licensed teacher to provide the behavioral supervision of remote site students.

Apple Classroom Of Tomorrow (ACOT)

The Apple Classroom of Tomorrow (ACOT) is an innovative program that has given all students and all teachers a personal computer both at home and at school. These computer-saturated classrooms can be found in California, Tennessee, Ohio, and Minnesota. The program is very diversified; classrooms are located in affluent, inner-city, suburban, urban, and rural schools in grades two through nine. Computer use in these programs averages 50% per day. The noise level caused by the equipment and the high degree of individual learning makes the classroom environmentally different from the traditional classroom.

The inner-city fifth and sixth grade ACOT school in Memphis, Tennessee has carried technology one step farther by giving every child a modem at home and by setting up an electronic bulletin board. These modems allow interaction between the teachers and the students and their families outside of the regular school setting.

School Of The Future In New York

The School of the Future in New York City's Community School District 2 is an innovative secondary school for grades 7 through 12 that opened for 75 seventh-graders this fall. The project was made possible with a grant from the U.S. Secretary of Education's Fund for Innovation in Education and with commitments from the New York Department of Education's administrators. With the help of technology, the curriculum will be student-centered rather than teacher-dominated. Instead of the regular 45-minute block of class time, students will learn in larger blocks of time to allow them to fully investigate issues. Interactive videodiscs, compact disc read-only memory (CD-ROM) and telecommunications, desktop publishing, and computer-assisted instruction are some of the technological tools that will be integrated into the classroom instruction.

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Texas Research League
P.O. Box 12456
Austin, Texas 78711

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