

CAD before they enter Grade 11. This CAD program works on Dell Pentium stations including a 27" monitor/VCR, HP plotters, and HP Deskjet 2000. Each student learns the AutoCAD and VisualCAD software packages and is required to design his or her "dream home."

The Computerized Office Technology program uses a learning package in which all computers are IBM and networked through the Novell system. Students work dependently and independently of the teacher in a variety of settings: medical, legal, general. Once students are proficient in a competency, they intern in a regular office setting to get a sense of real life office practices while utilizing the technology in which they have been trained.

Students in Health Services programs are exposed to a program series that includes CD-ROM medical terminology, which brings up the latest in vocabulary and definitions within a context of "live-work" scenarios that students are more likely to identify with

and remember longer. Also, several computerized dolls (male/female, adult/child) allow for realistic simulations of patient and infant care.

Science labs utilize the programs of several vendors, for example, Optical Data Corporation's *Living Textbook Laserdiscs*. Using a Power Mac, a laserdisc, a large monitor, and the microscope-adapted Flexcam camera, biological and physical science experiments are demonstrated in full motion by the instructor to the entire class. Such an experiment can also be shown via telecommunications to a large group of students assembled in the school's cinema.

In addition to these programs, the school also has the services of a contemporary audio-visual department that can augment any curriculum. An audio-visual computer with a scanner produces multimedia presentation and visual aids for use throughout the school. The Video Toaster is used to add dimension and text overlay in tutorial and special interest videos.

We can report that there is a heightened awareness of the need to incorporate elements of a technological society in these classrooms. Students and teachers communicate through several mediums that assist in the sharing and manipulation of the learning process. Teachers have become facilitators, and students, in the best sense of the term, are fine-tuned apprentices, ready to accept the challenges of a rapidly changing society. Both are learning the immediacy of interactive technology as it is occurring. Classrooms that are no longer boring or mundane, but instead are active as a result of electronic resources, have become the centerpiece for the restructuring movement. Faculty and students involved in interactive technology training are excited by the prospects. Those who sit on the edge get closer and closer to the process. Continuing professional development, cooperative teaching, and train the trainer strategies are expected to get everyone on board eventually.

## References

- Brooks, S. (1993). The quest for quality. *Vocational Education Journal*, 68(6), 42-44.
- Cetron, M., & Gayle, M. (1991). *Educational renaissance: Our schools at the turn of the twenty-first century*. New York: St. Martin's Press.
- Latham, G. (1988). Human resource training and development. In A. Carnevale, L. Gainer, & A. Meltzer (Eds.), *Workplace basics: The essential skills employers want*. San Francisco: Jossey-Bass.

*Dr. O'Neill is Director of the Southeastern Regional Vocational-Technical School in South Easton, Massachusetts.*

## 6. Technology-Based Programs and Drop-Out Prevention

by Phillip L. Cardon and Kip W. Christensen

In the United States, a large number of students leave the educational system before they receive a high school diploma. Many of these students are ethnic and racial minorities, may be academically and physically challenged, or have emotional and psychological problems. Such students are broadly considered at risk of dropping out of school before obtaining their high school diploma.

Many of these high school dropouts would remain in school if there were successful alternative high school edu-

cation programs available that were structured to better meet their specific needs.

Some of the most successful alternative education programs in the United States use technology to help students remain in school. The purpose of this article is to help teachers, principals, and school administrators understand that the use of technology in alternative education programs can help retain at-risk students in secondary education. This is briefly discussed under the following topics: characteristics of at-risk

students; some effects and consequences of at-risk students dropping out of school; alternative programs and the use of technology; alternative program factors that contribute to the retention of at-risk students; some technology-based alternative programs that have been implemented to retain at-risk students; and technology to assist physically challenged at-risk students.

### CHARACTERISTICS OF AT-RISK STUDENTS

McCann and Austin (1988) defined

at-risk students with three characteristics:

First, they are at-risk of not meeting educational goals or local and state graduation standards, and not being ready to become productive society members. Second, they are children whose behaviors interfere with the education of themselves and other students and require disciplinary action. Third, they are students who have family background characteristics that place them at risk. (pp. 1-2)

At-risk students are students who are considered more vulnerable to permanently leaving school than is the average student. The term *dropout* is used by most Americans to describe a person who leaves school early without a diploma and with no intention of returning to school. Both at-risk students and dropouts have unique characteristics that should be considered when looking for ways to retain students in school.

At-risk students have characteristics that are different from average students. Batsche (1985) provided a list of the common characteristics that defines the profile of at-risk students.

Individual characteristics include a history of school absenteeism, poor grades, low reading and math scores, low self-esteem, a history of behavioral problems, difficulty identifying with others, often work full time while attending school, the majority are male, are generally members of a minority group, and have feelings of being isolated and alienated (p. 1).

Family characteristics include family has several small children, father is seldom at home, father is often not employed, father did not obtain his high school diploma, mother was seldom home when student was an adolescent, there is little or no reading material at home, and the mother is the head of the family (p. 1).

Gardner (1988) reported that Goldman identified individual characteristics of at-risk students. She said, "As students, they are generally low achievers. They also differ from their more successful peers in development of self-esteem, task performance, cultural aspirations and life experiences" (p. 37).

### **Individual Characteristics**

The individual characteristics of at-

risk students may not be noticeable at an early age, but may become evident when the students enter their teenage years (Batsche, 1985). This makes identification of at-risk students difficult when they are in their early years. Therefore, it is important to look for these identifying characteristics during the early teenage years.

One familiar characteristic of many at-risk students is truancy, the absence from school without the parents' knowledge or permission (Hersov & Berg, 1980). According to Bell, Rosen, and Dynlacht (1994), characteristics of students that contribute to truancy include "school phobia, poor social and emotional functioning, ethnic or racial dissonance, failure to learn, a learning style not in pace with the classroom, learning disabilities, and health problems (which are often a symptom of underlying social or emotional problems)" (p. 204).

Some of the students who experience truancy have special needs or disabilities, or are gifted and talented. These students are often sent to remedial courses for special attention and help. They include the very bright as well as the learning disabled (Poirot & Robinson, 1994).

The prevalent use of alcohol and drugs among at-risk students in high school is another area of concern. According to Ediger (1987), students using alcohol and/or drugs tend to display characteristics that include little or no interest in school, personality change, rebellion at home, avoiding responsibility, skipping classes, increase in tardiness, out of touch with reality, avoiding and changing friends, criminal activity to support habit(s), and loss of memory.

The use of drugs by teenagers is a problem that will most likely not go away. Drugs used by popular figures in our culture have influenced students to believe that the use of drugs is okay and even "cool."

Another characteristic of at-risk students is that they sometimes feel alienated from their teachers and the school culture. Because the American school system is based on a single-culture educational system with most of the teachers being White, minorities are more susceptible to feeling alienated at schools. This problem can cause the

student to be at risk of dropping out of school by creating a cultural barrier between the student and the teacher (Beck & Muia, 1980). Another problem facing minority students is language barriers. Many students today speak English as a second language, which can develop barriers between them and their peers, teachers, and school administrators (Henry, 1986).

### **Family Characteristics**

Many at-risk students are from impoverished, minority, or single-parent families. All of these groups of students have problems outside of school that challenge their will and desire to stay in school. Contrary to individual characteristics, the family characteristics should be noticeable at any age (Batsche, 1985).

One of the highest indicators of at-risk children is their socioeconomic background. The problems associated with poverty extend from the home into the school. The student may be required to hold a part-time or full-time job while attending school. In addition, they tend to feel alienated from a lack of unification with their peers, teachers, and principals.

Another family concern is that ethnic or racial minority students have a higher dropout rate than White students. For example, in 1993, Hispanics had a 27.5% dropout rate, the dropout rate among Blacks was 13.6%, and the White, non-Hispanic groups were at 9.8% (lower than the 1993 national average of 11.2%; McMillen, Kaufman, & Whitener, 1994).

The last area of concern is that of students from single-parent families. Some students from single-parent homes find it difficult to cope with the challenges of school because they are ill-prepared for the work load and other challenges associated with education (Kunisawa, 1988). Good education and work habits must be taught in the home if the students in today's educational system are to be successful in high school and beyond.

Most at-risk characteristics can be seen before the student ever decides to drop out of school. If these students can be identified early, the educational system can try to retain these at-risk students until graduation.

## EFFECTS/CONSEQUENCES

When at-risk students drop out of high school, there can be a number of consequences. These involve individual, social, health-related, educational, and economic consequences.

### Individual

Some of the individual consequences of at-risk students dropping out of school include a lack of basic education, an increase in the number of career and economic disappointments, an increase in frustration, and a feeling of being alienated. Dropouts have more difficulty obtaining satisfying, fulfilling, and economically rewarding employment than do high school graduates. This can result in the socioeconomic status of dropouts being generally lower than that of high school graduates. Also, students who drop out of school typically have fewer opportunities for employment and promotion (Rumberger, 1987; Weber, 1986).

### Social

When at-risk students decide to drop out of school, they initially do not understand the effects their decision has on society. According to Weber (1987), a large amount of criminal activity is indirectly related to at-risk students dropping out of school. Weber also stated that a dropout is 6 to 10 times more likely to commit or be involved in criminal activity than students in school. In addition, dropouts constitute more than 80% of incarcerated people in state prisons. These inmates do not hold jobs and, therefore, do not contribute to society.

### Health Related

Other consequences from at-risk students dropping out of school are related to the individual's health. Studies have shown that high school dropouts are more likely to suffer from high blood pressure and heart attacks than non-dropouts. Other studies have indicated an increase in suicide attempts by dropouts and at-risk students over their counterparts (Weber, 1987).

Dropping out of school could also contribute to higher incidents of other health-related concerns. One study found that increased unemployment was associated with increased rates in mortality, suicide, and admission to

mental hospitals. If this is true, then dropouts, who have a higher incidence of unemployment, could also experience higher rates of mortality, suicide, and mental illness. This is only an assumption, since the causal relationship between dropping out of school and subsequent physical and mental health has not yet been confirmed through research (Rumberger, 1987).

### Educational

The educational consequences of at-risk students dropping out of school seem to occur in a variety of areas. The dropout problem is likely to be perpetuated in families where one or both of the parents were dropouts. Some of the consequences of students dropping out of school cited by school administrators included permanent intellectual damage to students and the lowering of school standards and achievements.

In the future, jobs will be more difficult for high school dropouts to obtain. According to Walter (1993), by the 21st century, a worker will need almost 14 years of education in order to obtain an average job in the Southeast. Jobs involving technical skills will be in high demand and will require additional education.

### Economic

The dropout rate can have tremendous economic consequences. Weber (1987) reported on a study that tried to assess the losses to the nation that could be associated with male dropouts who were 25 to 35 years old. The results showed estimates of \$71 billion in lost federal and state government revenues and \$3 billion a year in welfare expenditures.

## ALTERNATIVE PROGRAMS AND THE USE OF TECHNOLOGY

There are a number of alternative programs operating in the United States that are structured to give at-risk students a successful educational experience. Several of these programs incorporate the use of technology as a primary component of daily student activities.

Twelve factors that Batsche (1985) believes contribute to the retention of at-risk students are as follows:

1. There should be some form of financial aid available to assist the eco-

nomically disadvantaged students in finishing school.

2. Peer support in classroom and extracurricular activities are important in helping the high-risk student to form bonds that will keep him or her in school.
3. The school should provide realistic training that is related to post-high school jobs. This is closely related to education in vocational and technology fields.
4. Counseling services should be provided to assist students with personal problems that affect their school work.
5. The school should have an alternative program that meets the expectations of the parents and students.
6. Students should be able to talk with teachers as equals and not feel intimidated or powerless in their educational efforts.
7. The students should be able to approach the teachers with questions or problems.
8. The outcomes of the learning situations should be clearly defined.
9. The methods should be appropriate to accomplish the assigned task.
10. The sequence for learning should be well-defined and communicated to the students.
11. The rules for learning should be established and communicated well.
12. The performance standards required by the teachers and administrators should be clearly indicated (p. 3).

These factors are evident in almost every effective alternative education program. Without most of these factors, alternative programs would not be able to meet most of the needs of at-risk students. Some of these alternative programs will be discussed in the following section.

## SOME SUCCESSFUL PROGRAMS

### A National Blue Ribbon School

A successful alternative program is located in the Berkshire Union Free School District (BUFCD) in Canaan, New York. This program was developed in 1965 to provide public education for at-risk youth who were failing in school and in the community. Most of these students have been diagnosed as having emotional handicaps. These dis-

abilities tend to hinder their educational performance and learning experiences.

The BUFGD program moved into a new 87,000 square foot facility in 1992. The building is filled with the latest technological devices from computers to multimedia work stations. The curriculum is designed to expose each student to as much technology as possible. The program also uses this technology to assist in instruction.

In 1991, Berkshire was named the best school for at-risk students by the state of New York, and in the same year, it was pronounced a "National Blue Ribbon School of Excellence" by the U.S. Department of Education (Richman, 1994).

### **Smart Classroom**

On the West coast, another successful alternative program is located in the Hueneme School District in Hueneme, California. This program utilized a "Smart Classroom," filled with technological tools. With a predominant minority student body (17% Black and 50% Hispanic), this district used its allotment of state lottery funds for modular, media-based instruction. The district also converted a drafting lab and a wood lab into a technology room where students could experiment with computerized robotics, computer-aided manufacturing, computer publications, and aeronautics and pneumatic technology, among other activities.

The Hueneme School District reported that from 1987 to 1990, the district observed a tremendous improvement in the California Assessment Program (CAP) scores. These improvements coincided with the district's implementation of technology-based education in the classrooms. The average daily attendance of the "futuristic science classroom" was 98% in 1990, with very few referrals to the office for disciplinary concerns. The school district stated that the program demonstrated that "daily instruction in a challenging, hands-on, technological environment is associated with improved student attendance, discipline, attitude, and achievement" (Peck & Catello, 1990, p. 55).

### **Learning Circles**

An experiment performed by Spaulding and Lake (1991) suggested

that students who fail in traditional classrooms can succeed by using computer networks called Learning Circles. The experiment consisted of dividing low-achieving writing students into two groups—a treatment group and a control group. The students in the treatment group participated in a Learning Circle network using the AT&T Learning Network to communicate with students in Alaska, California, Nebraska, New Jersey, France, and Germany. The students in the control group performed similar projects using traditional media center materials without contacting other locations directly.

Spaulding and Lake (1991) found that the students who participated in the treatment group showed a significant increase in their writing abilities while the students in the control group showed no significant increase in performance. Spaulding and Lake concluded that the use of computer networks and communication technology may help to provide a better education for at-risk students.

Riel (1992) stated that at-risk students who used the AT&T Learning Network felt comfortable communicating with other students. Some of these at-risk students have serious physical and mental problems that would normally influence their peers to not want to associate with them. At-risk students with disabilities or social differences become "invisible" and are viewed by their fellow communicators as regular students. The AT&T Learning Network actually helps most at-risk students feel accepted among their peers and teachers. This feeling of acceptance helps at-risk students decide to remain in school.

### **The Program in Azusa**

The Azusa Unified School District in Azusa, California, offers another alternative program that incorporates the use of technology to help at-risk students. This program focuses on increasing the average daily attendance (ADA) of students in the various schools.

The program consisted of about 45 students, two teachers, and one aid in two classroom centers. They spent four class periods each day working with Integrated Learning System workstations. These workstations consisted of computer terminals and software to enhance the English, reading, social

studies, math, and science materials, making them easier to learn and understand. The staff were capable, patient, and caring individuals who wanted to see these at-risk students succeed.

Before the program began, more than 50% of all incoming freshmen did not make it to the end of their senior year, and ultimately did not graduate. After the program was instigated, daily attendance increased, and the drop-out rate began to decline. At the end of its first year in existence, the program was able to retain 95.8% of the incoming 9th grade students and obtain a 93.1% ADA rate. After the second year, the program had an ADA rate of 96.1% and a student retention rate of 93.2%. These numbers showed a tremendous increase over the dismal drop-out rates from two years prior to the program (Jackson, 1991).

### **OASES**

Another alternative education program using technology is the Occupational and Academic Skills for the Employment of Students (OASES) program in Pittsburgh. This program serves over 100 at-risk students in middle school. The program provides the students with a prevocational experience while training them in school. The OASES program teaches the students how to use technology and tools while still emphasizing the importance of academic performance (Monaco & Parr, 1988).

### **TECHNOLOGY TO ASSIST PHYSICALLY CHALLENGED AT-RISK STUDENTS**

Technology is available that will allow all students to participate in classroom activities. For example, there are new computer-assistive technologies that help physically challenged students to work with computers (Logwood & Hadley, 1996). Some of these technologies include the following:

1. Keyboard overlays that help prevent the student from pressing an undesired key.
2. Touch-activated devices that can operate a keyboard.
3. Upright goose-neck devices that allow the simulation of mouse operations by moving a long device with the face, head, or mouth.
4. Text-to-speech communication programs that help students with speaking disabilities to communicate with

teachers and other students (pp. 17-18).

These devices allow special needs students to feel successful and independent. Most of the physically challenged students who have used these devices have greatly improved their classroom performance and have shown an improvement in their attitudes toward themselves and others.

Another example of technology that helps at-risk students is the use of computer networks. With the help of a com-

puter network, deaf children can communicate with their classmates and participate in class discussions (Riel, 1992).

The technology-based alternative education programs discussed here demonstrate the importance of incorporating technological devices with teacher instruction in order to assist in the retention of at-risk students. These programs are only a few of the many alternative programs that are operating in the United States to help at-risk students see the value of education and

remain in school.

For future generations of children, students, and adults to become successful, contributing members of society, more efforts must be focused on how to help at-risk students remain in school and have successful educational experiences. The use of technology in alternative programs has been shown to be a significant tool in assisting and retaining more at-risk students in high school.

## References

- Batsche, C. (1985). *The high school drop out: Vocational education can help*. Normal, IL: Illinois State University. (ERIC Document Reproduction Service No. ED 262 213)
- Beck, L., & Muia, J. A. (1980). A portrait of tragedy: Research findings on the dropout. *The High School Journal*, 64(2), 65-72.
- Bell, A. J., Rosen, L. A., & Dynlacht, D. (1994). Truancy intervention. *The Journal of Research and Development in Education*, 27(3), 203-211.
- Ediger, M. (1987). *School dropouts, absenteeism, and tardiness*. (ERIC Document Reproduction Service No. ED 279 941)
- Gardner, M., Stone, A., Goldman, S., Scott, T., Withrow, F., Edwards, C., Golden, K., Vasquez, N., Bucy, S., & Smoak, M. (1988). Technology and the at-risk student. *Electronic Learning*, 8(3), 35-49.
- Henry, M. D. (1986). *Halting dropouts: To be or not to be. There is no question!* Marina Del Rey, CA: California Educational Research Association. (ERIC Document Reproduction Service No. ED 277 127)
- Hersov, L. A., & Berg, I. (1980). *Out of school*. New York: Wiley.
- Jackson, D. (1991). Teaming up to take a risk. *Media & Methods*, 27(5), 12, 19-20.
- Kunisawa, B. N. (1988). A nation in crisis: The dropout dilemma. *NEA Today*, 6(6), 61-65.
- Logwood, M., & Hadley, F. (1996). Assistive technology in the classroom. *The Technology Teacher*, 56(2), 16-19.
- McCann, R. A., & Austin, S. (1988). *At-risk youth: Definitions, dimensions and relationships*. Philadelphia: Research for Better Schools. (ERIC Document Reproduction Service No. 307 359)
- McMillen, M. M., Kaufman, P., & Whitener, S. D. (1994). *Dropout rates in the United States: 1993*. Washington, DC: U.S. Department of Education Office of Educational Research and Improvement. (ERIC Document Reproduction Service No. ED 375 222)
- Monaco, F., & Parr, P. (1988). From problems to promise in Pittsburgh. *Vocational Education Journal*, 63(6), 39-41, 52.
- Peck, K. L., & Catello, J. P. (1990). Instructional alternatives for at-risk students. *Media & Methods*, 30(5), 12, 54-57.
- Poirot, J., & Robinson, G. (1994). Parent involvement and technology with at-risk students. *Computer Teacher*, 21(6), 44-45.
- Richman, J. A. (1994). At-risk students: Innovative technologies. *Media & Methods*, 30(5), 25-27.
- Riel, M. (1992). Making connections from urban schools. *Education and Urban Society*, 24(4), 477-488.
- Rumberger, R. W. (1987). High school dropouts: A review of issues and evidence. *Review of Educational Research*, 57(2), 101-121.
- Spaulding, C., & Lake, D. (1991, April). *Interactive effects of computer network and student characteristics on students' writing and collaborating*. Paper presented at the annual meeting of the American Educational Research Association, Chicago.
- Walter, D. M. (1993). *Tech prep and dropout prevention* (Rev. ed.). Pendleton, SC: Partnership for Academic and Career Education. (ERIC Document Reproduction Service No. ED 362 634)
- Weber, J. M. (1986). *The role of vocational education in decreasing the dropout rate*. Columbus, OH: Ohio State University, National Center for Research in Vocational Education. (ERIC Document Reproduction Service No. ED 264 444)
- Weber, J. M. (1987). *Strengthening vocational education's role in decreasing the dropout rate*. Columbus, OH: Ohio State University, National Center for Research in Vocational Education. (ERIC Document Reproduction Service No. ED 284 062)

Mr. Cardon is a doctoral student in the Department of Technology Education at The Ohio State University, Columbus. He is a member of the Alpha Chapter of Epsilon Pi Tau. Dr. Christensen is an Associate Professor in the Department of Technology Education at Brigham Young University, Provo, Utah.