**Snapshot #27**

# Success for At-Risk Students Through Computer-Assisted Instruction

## Pensacola High School
## Pensacola, Florida

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## RESEARCH FINDINGS

Of the schooling practices that research has shown to be effective for educating students at risk of school failure, staff of Pensacola High School in Pensacola, Florida make use of many that are appropriate for students in grades 9-12. As expressed in EFFECTIVE **SCHOOLING PRACTICES: A RESEARCH SYNTHESIS/1990 UPDATE** (Northwest Regional Educational Laboratory, April 1990), key practices include:

### 1.3.1 STUDENTS ARE CAREFULLY ORIENTED TO LESSONS

c. The relationship of a current lesson to previous study is described. Students are reminded of key concepts or skills previously covered.

### 1.3.2 INSTRUCTION IS CLEAR AND FOCUSED

d. Students have plenty of opportunity for guided and independent practice with new concepts and skills.

h. Computer-assisted instruction... supplements teacher-directed learning and is integrated with it, rather than supplanting teacher-led activities.

### 1.3.4 STUDENTS ROUTINELY RECEIVE FEEDBACK AND REINFORCEMENT REGARDING THEIR LEARNING PROGRESS

f. When computer-assisted instruction is used, activities are chosen which give students immediate feedback regarding their learning performance.

**1.3.5 REVIEW AND RETEACHING ARE CARRIED OUT AS NECESSARY TO HELP ALL STUDENTS MASTER LEARNING MATERIAL**

e. When selecting computer-assisted learning activities, teachers make certain these include review and reinforcement components.

**1.4.3 PERSONAL INTERACTIONS BETWEEN TEACHERS AND STUDENTS ARE POSITIVE**

b. Teachers praise and encourage student effort, focusing on the positive aspects of students' answers and products.

**1.6.1 STUDENTS AT RISK OF SCHOOL FAILURE ARE GIVEN THE EXTRA TIME AND HELP THEY NEED TO SUCCEED**

f. Teachers and aides communicate warmth and encouragement to at-risk students, comparing their learning with the students' own past performance rather than making comparisons with other students.

At the school level:

**2.3.3 STAFF ENGAGE IN ONGOING PROFESSIONAL DEVELOPMENT AND COLLEGIAL LEARNING ACTIVITIES**

h. Ongoing technical assistance is made available to staff as they pursue school improvement activities.

**2.5.1 LEARNING PROGRESS IS MONITORED CLOSELY**

c. Summaries of student performance are shared with all staff who they assist in developing action alternatives.

**2.6.1 STUDENTS AT RISK OF SCHOOL FAILURE ARE PROVIDED PROGRAMS TO HELP THEM SUCCEED**

e. Programs and activities for at-risk students are carefully coordinated with regular classroom activities.

g. Remediation programs for older students incorporate validated approaches such as...computerassisted instruction.

j. The findings from ongoing monitoring efforts are used to adapt instruction to students' individual needs.

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## SITUATION

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At the extreme western end of the Florida "panhandle" is the Escambia County School District, which serves a student population of 42,000. Some nineteen hundred of these students attend Pensacola High School (PHS), a 9- 12 school located in the city of Pensacola. AfricanAmerican youth make up 45 percent of PHS's student population, white students comprise another 45 percent, and students from other racial or ethnic groups make up the remaining 10 percent.

The families of PHS students represent a wide economic range: although one-fourth of the school's students come from advantaged, well-to-do homes, fully half of them are from the other end of the socioeconomic spectrum and qualify for free and reduced-priced lunches. PHS staff describe the school as "three schools within a school," since it comprises the regular instructional program and a Dropout Prevention program, as well as being an International Baccalaureate magnet school.

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## CONTEXT

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In 1985 Pensacola High School became a field test site for the Summer Youth Program operated by the local Private Industry Council with funds from the federal Job Training Partnership Act (JTPA). The summer program included a computer-assisted instruction (CAI) component, and the JTPA Title II funds supported the initial development of a CAI laboratory and program at PHS. Other high schools in the Escambia district were also involved in the program, which was coordinated by English teacher and CAI specialist Gene Evans.

In 1987, Pensacola assistant principal Sarah Armstrong served on a team of Escambia district educators working on a program proposal aimed at lowering the district's high dropout rate. With CAI facilities already in place, and with research findings supporting the use of CAI with dropout-prone students, Gene Evans encouraged the proposal developers to write a CAI component into the district's proposal. They did so, the proposal was approved, and since that time Pensacola's CAI lab has developed into a large-scale and critical component of the school's program for supporting students at risk of school failure. Supported by a combination of JTPA, dropout prevention, and special education resources, the CAI program serves more than a fourth of PHS's students. Participants engage in CAI activities during daily 20-minute sessions, accompanied by their teachers and the instructional assistant who serves as a the lab's proctor.

In its present form, the CAI program uses software developed by the Computer Curriculum Corporation (CCC) headquartered in Sunnyvale, California. The program's "host" computer is located at PHS, and other participating schools are connected to the system by modem. The host has a large capacity; it can accommodate 5,000 students, each working in five curricular areas.

### CAI LEARNING ACTIVITIES

The CAT scores of participating students are used to determine the level at which each student begins in each of the learning areas addressed by the CCC software-reading, mathematics, language arts, spelling, and a pre-employment course in "survival skills." Regardless of initial achievement level, matching students with CAI activities that will allow them to have scores of 80 percent or above is a key feature of the program. For these at-risk students, achieving at or above the 80 percent level is sometimes their first experience of school success, and survey results indicate that their self-esteem is greatly enhanced as a result. Achieving 80 percent mastery also insures that students will be ready to take the next step in whatever learning sequence they are pursuing.

A Teacher Information packet highlights the individualization of instruction that the CAI program makes possible:

The individualized program is provided as the computer monitors each student's progress and

1. diagnoses the student's level of understanding of a concept.

2. selects or generates exercises appropriate for each student.
3. analyzes all student responses.
4. gives appropriate confirmation, correction, error message, or hints.
5. displays the student's results at the end of a session.
6. records the student's performance daily.

More specifically, the CAI curriculum begins with what are known as Initial Placement Motion (IPM) algorithms, which are set so that each student will be able to produce at his/her actual grade level of achievement, regardless of test scores.

Let's say a student is working on mathematics skills. When the student generates an incorrect response on a problem involving the subtraction of fractions, the program makes note of this and presents a similar problem within the next six or eight problems it offers. If this second problem is also missed, the program continues to present, at frequent intervals, problems calling for skill in subtracting fractions. If five such problems are offered and missed, then only problems of this kind are presented until the student is able to produce correct responses to fourteen of them in a row. Then, this type of problem is again interspersed with other kinds of math problems until 17 subtracting-fractions problems in a row are answered correctly. This is considered mastery of the subskill of subtracting fractions.

The program, however, "remembers" that this student had previously experienced difficulty with problems involving the subtraction of fractions. At the end of the next twenty 20-minute sessions, another subtracting-fractions problem is presented to determine whether the student remembers. If the student misses this problem, the cycle begins again.

Similar cycles are carried out within all curricular and skill areas, and students rarely require more than two of these cycles before they are able to retain their skills in the area under consideration.

Mr. Evans provided general information on the program's many elements. The reading component, for example, has learning activities ranging from the kindergarten to the adult levels. Among its many skill areas is "Critical Reading Skills," in which students read a passage, with a time setting that prevents them from referring back to the passage when it is time to respond to questions about it. Mr. Evans notes that once students become accustomed to this pacing, their comprehension scores begin to improve rapidly.

Within the Language Arts component, the audio feature of the program "speaks" words that students are to spell, and students type the words in response. The word processing part of the component leads students through constructing sentences, then paragraphs, then types of written products, such as "how to" instructions and descriptions of persons, places, or things.

The Mathematics component contains a huge volume of material-enough for five years' worth of sessions at the usual student rate of five 20-minute sessions per week. Skill areas include problem solving, math concepts, and math survival skills, which focuses on real-life applications of mathematics knowledge.

**RECORD KEEPING**

Highlights from among the many kinds of reports the software is able to generate include:

- Classes. Each participating student is coded by grade, class, and whether he/she is a JTPA student, a dropout prevention student, a special education student, and so forth. This

makes it possible to generate many different kinds of student lists for different purposes.

- Individual. Reports on individual students indicate areas of emphasis, level of participation, modifications to programs (e.g., turning off the "timing" function for special education students, who are generally allowed to take all the time they want to respond to learning activities).
- Enrollment. Mr. Evans has cross-referenced CAI activities with district performance standards, making it possible to identify and prescribe activities in support of required student performance levels.
- List. The record keeping system can generate lists of CAI participants by class and grade level, what CAI activities these students are currently pursuing, what they have completed, and so on.
- Course Report. This is a record of each participant by curricular area, grade level, problems attempted, number correct, percent correct, identification of learning problems, likelihood that a given student will be presented with a certain kind of problem, etc. Teachers receive Course Reports every Friday.
- Gains. This report indicates the number of sessions in which a student has participated, the amount of time he or she has spent on the computer since completion of the Initial Placement Motion, the gain (expressed in months), and the grade level at which the student is working.
- Worksheet. Teachers can ask for individualized worksheets to be generated for their students, based on each student's learning history and needs, poorest performance area, and other factors. Teachers can specify whether or not the worksheets will include answers.

The system is also able to identify which students throughout the district are at the computer terminal at any given moment, specify the last time a given student attended a CAI session, and carry out other functions.

**THE ROLE OF TEACHERS**

Mr. Evans emphasizes that the impressive technology should not obscure the fact that the heart of the CAI program is the teacher-student interactions that take place in relation to the computer activities. First of all, teachers receive training and acquire experience pursuing the CAI activities before their students do, which enhances their ability to assist when students have difficulties. Teachers always accompany their students to the CAI lab, taking note of their students' daily progress and calling students' attention to ways in which their performance is improving.

The weekly reports on student performance that teachers receive enable them to tailor learning activities to address areas of need, while praising and rewarding success. Teachers can also utilize the lab facilities for specific, short-term purposes, such as having students write papers using the lab's word processing capabilities or exposing them to review material in preparation for upcoming tests.

An excerpt from the program's Computer Assisted Instruction Philosophy states:

The program recognizes that the classroom teachers are the most important element in computer assisted instruction. Properly trained teachers who have control over the CAI program can provide their students with an added dimension in learning. In the end, it is the classroom teachers' creativity, enthusiasm, the professional competence that will transform instruction into exemplary student achievement.

## PRACTICE: HIGHLIGHTS FROM A DAY IN PENSACOLA HIGH SCHOOL'S COMPUTER LAB

Ms. Sandra Robinson's class entered the large, bright CAI lab and immediately occupied most of the lab's 24 workstations. Obviously familiar with lab routines, each student entered his or her identification number into the computer, which responded by presenting predetermined activities selected on the basis of that student's learning needs. While the students were working, Ms. Robinson pointed out that since no two students have the same learning strengths and needs, different questions are presented to each individual, making "cheating" irrelevant and impossible.

Ms. Robinson described her methods for enhancing student motivation in the CAI lab. Each time a student gets a score of 100 during a session, that student is recognized by having his or her name displayed as a member of the "Top 100 Club." Ms. Robinson also factors in students' weekly CAI lab reports and worksheet grades as one-fourth of their overall grade during each six-week period. "I do it this way so they will know that computer lab activities are important, not just ‘busywork'," she says. Later in the day, another of Ms. Robinson's classes made use of the lab, again in an efficient, businesslike way.

Throughout the day, Ms. Ann Stanley, the instructional assistant who is the CAI lab proctor, worked with each group of students, answering questions and providing assistance as needed. Like other PHS staff members who have experience with the lab, Ms. Stanley believes that it is the experience of academic success that inspires students to apply themselves in pursuing CAI activities. "I like to see kids succeed," she says, "and most of them do in here." She believes that students' feelings about themselves improve because of increases in content knowledge, but also because they are developing computer skills. Students conducted themselves in a focused and orderly manner as groups rotated in and out of the lab at 20-minute intervals as the school day went by.

Mathematics teacher Mr. Jack Moberly works both with PHS students and at Tate High School with adults preparing for their high school equivalency certificates. Asked about the difference between these two groups, Mr. Moberly noted that they're similar in most ways, but that adults have appreciably longer attention spans, and thus can work productively for longer periods of time than the 20-minute intervals appropriate for younger students.

Of the kinds of information that CAI record keeping system provides, Mr. Moberly is most concerned with data on individual student progress. "Teachers aren't as interested in identifying the grade level on which a student is working as they are in seeing whether a student is experiencing learning gains, and if so, how much. This system keeps us abreast of that."

When a group of Ms. Katherine Frazier's English-as-aSecond -Language students were settled in at their workstations and tackling the day's activities, she described the value of CAI lab activities for ESL instruction. She remarked that her students function on many different levels-from totally non-English speaking to fairly proficient in English skills. Consequently, the CAI program, with its ability to tailor and individualize instruction, can offer each student lesson content on his or her own level.

Although the program has activities in seven different languages, it does not include Vietnamese, which is the native language of most of PHS's ESL students. Consequently, these students engage in reading activities in English, beginning at very simple levels and gradually

building English skills.

## OUTCOMES

The Escambia School District's dropout prevention program received recognition from the State of Florida as an exemplary program for the 1991-92 school year, with the CAI component cited as a major reason for the program's success. A close relationship between time spent on CAI lab activities and NCE gains on the reading and math portions of the CAT was noted for all four of the district's high schools.

Focusing in Pensacola High School's program in particular, Gene Evans notes that 30 percent of PHS's 1992 graduates were graduates of the CAI lab. Data on students with comparable academic histories and no CAI lab experience indicate that half the students comprising that 30 percent would not have graduated without the lab experience. This conclusion is also supported by data on PHS students before the inception of the program. During the years that the CAI program has been in operation, the dropout rate for all CAI participants has not exceeded five percent, and the dropout rate for the JTPA students-who are most atrisk-has remained below two percent.

A study of the use of the CAI lab by special education students found that these students have experienced an even larger gain per hour of CAI activity than have the regular program students. They enter at a much lower level, of course, but the study found that these students-educable mentally retarded, physically impaired, speech and hearing impaired, educationally handicapped, specific learning disabled, and severely emotionally disturbed-have exhibited as much as a month of educational growth for each hour of CAI instruction. Specifically, their gains were somewhat greater than those of regular program students in the Initial Reading strand, equal to the regular program students in Readers Workshop activities, and significantly higher than regular program students in Math Concepts and Skills.

Is there a "down side" to this highly successful program? Gene Evans believes that the program could produce even greater achievement gains if computer equipment were more modern, if acquisition of equipment were not completely dependent on grant moneys, and if there were a budget for maintenance and repair. He wishes there were resources to open up the CAI lab's offerings to at least some of the non-at-risk population. And he also states that the program has received insufficient support and attention from the outgoing district administration.

On the plus side, Mr. Evans cites the openness and support of PHS principal J. P. Cone among the reasons for the program's success. In addition, Mr. Evans is hopeful that the incoming district superintendent will provide greater support for the CAI effort.

Since only low achievers are scheduled into the program at the present time, what about the potential for program students being stigmatized? Mr. Evans notes that this potential exists, but is minimized due to the use of the lab for word processing by non-program students when program students are not making use of it. In addition, adult participants in Community Education classes use the lab in the evenings.

For more information about the CAI program-at Pensacola High School in particular or throughout the Escambia district-contact Mr. Gene Evans, CAI Program Specialist, Pensacola High School, A and Maxwell Streets, Pensacola, Florida 32501, (904) 433-8291.

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