

The readiness of service providers to use technology was our first concern. This was dispelled by a survey of 1,000 special education teachers that showed 85% used technology in literacy instruction, 97% believed that technology can help students acquire literacy skills and 91% expected to increase their use of technology in the future.

Burton-Radzely, L. (ED)(1998). A national perspective on special educators' use of technology to promote literacy: Technical Report. Washington, DC: MACRO International and the Council for Exceptional Children.

We also knew that research into service conditions under which the products would be used was necessary. We found, for example, that adult clients have a remarkable range of conditions under which they received basic education services. Services were provided in schools, churches, libraries, correctional facilities, and community centers.

Service providers were certified less than 50% of the time. Equipment in many of these facilities was modest. Computers, monitors and printers were often older and limited in number. Telephone modem connections were more frequent than T1 lines.

We also found that many children are served outside the regular classroom setting and regular classroom hours.

As a result, the following criteria guided the design of SkillsTutor and Learning MileStones:

1. The software needed to be operational on phone lines, as well as fiber optics.
2. The software needed to run efficiently on earlier computers and printers as well as current ones.
3. The software needed to be viewable on a wide range of monitors.
4. The software needed to be manageable by paraprofessionals, parents and teachers.
5. The software needed to be manageable by children, adolescents and adults in the absence of any instructional supervision.

The purpose of these products is highly defined to cover content that is required by standardized tests and by state tests. Skills and concepts in subject matter that are not tested in the United States are not included. As a result, the content of major tests is monitored on a regular basis. The concepts and skills provided are managerially possible because there is a remarkable consensus among test makers and among state policy makers regarding the concepts and skills that will be tested.

In one area, "higher order thinking skills," Achievement Technologies used the research synthesis generated by the Organization for Economic Cooperation and Development in Paris (1990) at the request of the United States Department of Education. This synthesis identified 17 teachable thinking skills from worldwide research.

"Higher Order Thinking Skills" Report from the Conference of the Center for Research in Education, Organization for Economic Cooperation and Development. Paris, 1990.

Vocabulary for children's programs came from studies by some of the best-known researchers in the field:

Harris-Jacobson's Basic Reading Vocabularies
 Dale-O'Rourke's The Living Word Vocabulary
 TASA's The Educator's Word Frequency Guide
 Fry's The Reading Teacher's Book of Lists.

The mathematics program was developed just as the National Council of Teachers of Mathematics (NCTM) published their standards. ATI had the advantage of these standards at the beginning of the development project. In addition, an advisory board was created that included district level mathematics supervisors and a college level mathematics educator who was also a member of the NCTM board. This board remained intact during the two years required for development.

Research for the Selection of Instructional Strategies

Scientifically based research from the academic field of special education was heavily used in developing the instructional model used by special educators throughout the country. In fact, several features of this instructional model have been "codified" into federal and state special education laws:

1. Establishment of clear, behavioral outcomes
2. Diagnostic and prescriptive teaching
3. Commitment to structured curriculum materials
4. Reinforcement of appropriate responses
5. Modeling and shaping of correct responses
6. Control of task difficulty
7. Small step instruction
8. Extensive practice
9. Regular testing for progress

A major meta-analysis of all intervention research published since "learning disabilities" were officially recognized in 1963 was published in 1999. The authors searched for factors associated with high effects – regardless of the model of instruction used or the content of instruction. Factors identified are found in this instructional model.

Swanson, H.L., Hoskyn, M., Lee, C. (1999). Intervention for students with learning disabilities: a meta-analysis of treatment outcomes. New York: Guilford.

These instructional features have been adopted by behaviorally-oriented program developers who call their model "direct instruction." Gersten reviewed extensive evaluations of direct instruction in 1985. "Six studies indicated that direct instruction tends to produce higher academic gains for handicapped children than traditional approaches. They also suggest that some of the more subtle principles of direct instruction – such as insistence on complete (rather than partial) mastery of each step in the learning process – are important."

Gersten, R. Direct instruction with special education students: A review of evaluation research. *The Journal of Special Education* 19:41-58, 1985.

Vaughn, S., R. Gersten, and D.J. Chard. The underlying message in LD intervention research: Findings from research syntheses. *Exceptional Children* 67(1): 99-114. 2001.

Much of this work has scientific basis that goes back to the 1950s and the seminal paper written by B.F. Skinner, which is cited in thousands of papers dealing with the topic of "programmed instruction." Programmed instruction begins with the outcome expected and a detailed task analysis of what behaviors students must show in successive steps needed in moving from little or no knowledge to full knowledge.

Skinner, B.F. "The Science of Learning and the Art of Teaching." *Harvard Educational Review*, 24, 86-97, 1954.

The behaviorism associated with Skinner was quickly challenged by other schools of thought. The two broadly different approaches to the design of instruction had numerous excellent researchers on different paths. These "schools" were called the following:

- Configurationally or stimulus-centered strategies (Robert Mager & Sidney Prossy)
- Connectionist or response centered strategies

Davis, I. K. "Presentation Strategies." In Hartley, J. (ED) *Strategies for Programmed Instruction: An Educational Technology*. London: Butterworth, 82-132, 1972.

The debate continues to the current time. However, the schools of thinking are often now referred to as "behaviorist" or "constructionist." Regardless, the research community is grounded in scientific methods of study. They just begin with different assumptions.

Frozier, R. C. The Computer as an Educational Tool: Productivity and Problem Solving. Upper Saddle River, NJ: Merrill, 1999.

The resolution is that instructional designers, such as Achievement Technologies, Inc., use the most useful insights of these fields of study, based on their perceived usefulness to the particular subject being taught and the kinds of tasks students need to confront in learning the skills and concepts.

Do These Scientifically Based Programs Work in a Variety of Field Settings?

The question of what happens when a scientifically based education program is operated away from its developers, in field settings, requires site-based evaluations.

However, no evaluation is valid if the developers direct it. If things are not going well at a site, a developer has the tendency to intervene in the on-going work at the site. No one wants children to get a poorly implemented program. However, this does not answer the question regarding whether or not the program will work without the developers.

The studies that follow were provided to the developers by the sites. The developers had no contact with the sites during the evaluations. This data is from communities using both current versions of the products and earlier versions.

Green Middle School Akron, (Green) Ohio

Strategy

Utilized SkillsTutor to improve overall core skills in grades 6 to 9 and to ensure the 9th grade proficiency scores consistently improved. Technology Coordinator, Paula Jameson states, "Each student has their own password and moves through a program that is tailored to fit his/her abilities. The program is beneficial to teachers because it is an interdisciplinary approach to learning, combining instruction in various subjects."

Results

	Pretest	Posttest
Writing	86%	95%
Reading	90%	94%
Math	75%	90%
Citizenship	79%	90%

Faribault Middle School Faribault, Minnesota

Strategy

At Faribault, nearly 1,000 sixth, seventh, and eighth graders take the Minnesota Basic Standards Test in math and reading. The school has instituted a four-part program to prepare students. First, they ask teachers to focus on basic skills. Second, the teachers are encouraged to identify students that need help and provide individualized instruction. Third, the school emphasizes that study hall is for work. Fourth, SkillsTutor is provided for all students for use at school, after-school or at home.

Results

- Students worked for less than two hours on computer programs, but the work done was in areas where they needed the most help.
- Between 14 and 15% more 8th graders passed the state tests than in the previous year.
- Bill Schmidt, Graduation Standards Facilitator, states, "SkillsTutor is a shining light on our educational horizon."

Miami-Dade Community College Miami, Florida

Strategy

As a cost effective and timely solution, the college used SkillsBank content in its vocational education program to diagnose student strengths and weaknesses and to place students at appropriate levels of instruction. Students immediately focus on those areas where individual improvement is needed.

Results

- Approximately 80% of students reach the required competency levels and pass the vocational tests needed to take such positions as firefighters, police officers, correctional officers, etc. Before this intervention, 60% failed the Test of Basic Education.

**National Hispanic University
San Jose, California**

Strategy

Pre-college/TRIO program characterized as a "beacon of hope" for ESL students from geographic regions overwhelmingly speaking a native language other than English.

Results

- Demonstrated gains of up to 2 years in reading comprehension.
- SkillsTutor made English less intimidating for students; increased students' comfort level with the learning process; and built a foundation for students to break down barriers to accomplish mastery of basic reading and writing skills.
- Students have completed reading at least one novel and are motivated to read more books and feel good about their improved English skills.

**Breaux Bridge Junior High School
Breaux Bridge, Louisiana**

Strategy

SkillsTutor is used in a variety of instructional programs at the school. Because the program is web-based, students also have access at home, making parents happy. Over 1250 activities were taken since February 2001, totaling more than 110 instructional hours.

Results

Breaux Bridge eighth graders passed their LEAP tests in surprising numbers. Out of 177 eighth graders who took the March mandated LEAP Test in Language Arts, 171 passed. Scores on SkillsTutor pretests and posttests showed significant gains:

- Mathematics (43%)
- Information Skills (65%)
- Reading (50%)
- Language Arts (64%)

**Eufala Alternative Program
Eufala, Alabama**

Strategy

At the Eufala Alternative School, middle and high school students with low-level skills ability were assigned 40 minutes each day. Students' pretest and posttest scores, based on a 100-point scale, were charted after completing each section of the program.

Results

Middle School			
	Pretest	Posttest	% Gain
Reading	35.0	48.0	37%
Language	50.6	65.8	30%
Mathematics	35.0	65.7	88%
Writing	47.0	80.5	71%
Study Skills	40.0	73.0	83%

High School			
	Pretest	Posttest	% Gain
Reading	52.4	75.5	31%
Language	54.0	75.3	39%
Mathematics	58.2	73.2	26%
Writing	53.6	76.6	43%
Study Skills	77.0	80.0	3%

- The majority of students made significant improvements from pretest to posttest scores.
- Students began to ask for extra time at the computer as their confidence levels increased.

**Point Pleasant Middle School
Point Pleasant, New Jersey**

Strategy

Students must pass the 8th grade GEPA and 11th grade tests with accelerated scores and feel empowered to achieve higher goals.

Results

- Language Arts scores increased from 87.2% to 91.4%
- Mathematics scores increased from 72.2% to 79.2%
- Dr. John Krewer, Superintendent states, "It is clear that Achievement Technologies cares about kids. We have embraced the SkillsTutor technology because it enables us to get greater impact with online instruction."

**Hallandale High School
Hallandale, Florida**

Strategy

At Hallandale High School in Hallandale, Florida, students needing remediation for the High School Competency Test (HSCT) were assigned to a computer lab. Ninety seniors had failed the HSCT. Forty were assigned to SkillsBank.

Results

The forty students demonstrated success at the next HSCT testing:

- Thirty-three (33) students passed the HSCT.
- The seven (7) students who did not pass did not attend school regularly. (Four of the seven had been in the country for less than one year.)

**Central East Middle School
Philadelphia, Pennsylvania**

Strategy

The school follows a "talent-development model" designed to expose all students to a core curriculum, emphasizing higher-order thinking competencies. In addition, participants receive mathematics instruction by computer every day for 10-week increments. Placement tests assess what each student knows and what each student must learn to be successful. Participants are then assigned a partner who needs the same lessons. Partners take turns answering selected questions.

Results

- In the first year, participants outperformed their counterparts by 10 scale points on math procedures and 5 points on problem-solving when matched with students of similar prior achievement at a comparable school.

**John Harvard Elementary School
Chicago, Illinois**

Strategy

SkillsBank content was used with fifth to eighth grade students to enhance their skills in reading and math in order to better prepare them to score well on the Iowa Tests of Basic Skills (ITBS). One hundred (100) students per day were tutored in the computer lab.

Computer-generated reports were sent quarterly to parents.

Results

- Scores on the ITBS increased 70% when compared to the last year's scores.
- Parent involvement increased significantly as a result of interest generated by the reports.

Computer Aided Instruction Program
Albuquerque, New Mexico

Strategy

For approximately 8-10 weeks, 379 non-traditional 14-18 year olds (typically under court order, on probation or on parole) participate in nightly sessions with SkillsBank technology and textbook supplements. This is their only educational activity

Results

- 89% of the participants passed the GED the first time they took the examination.

Adult Basic Education Program
Daytona Beach, Florida

Strategy

Adult students preparing to take the Test of Adult Basic Education (TABE) use the SkillsBank approach at their own speed. Both English-speaking adults and ESL adults moved at a rapid pace through the activities, mastering skills necessary to pass the TABE.

Results

- Adults completing this program demonstrated a success rate of 82 – 87%.

Mid-Cumberland Human Resource Agency
Serving 11 Counties, Tennessee

Strategy

440 adolescents participated in a summer program to raise their basic skills with the purpose of preparing them for passing the Tennessee Adult Basic Education Test and for gainful employment. Learners were provided four hours of instruction, four days a week, for six weeks.

Results

- A study by the Agency, funded by the North Tennessee Private Industry Council, reported gains of 1.13 years in reading and 1.41 years in mathematics for the six week period.