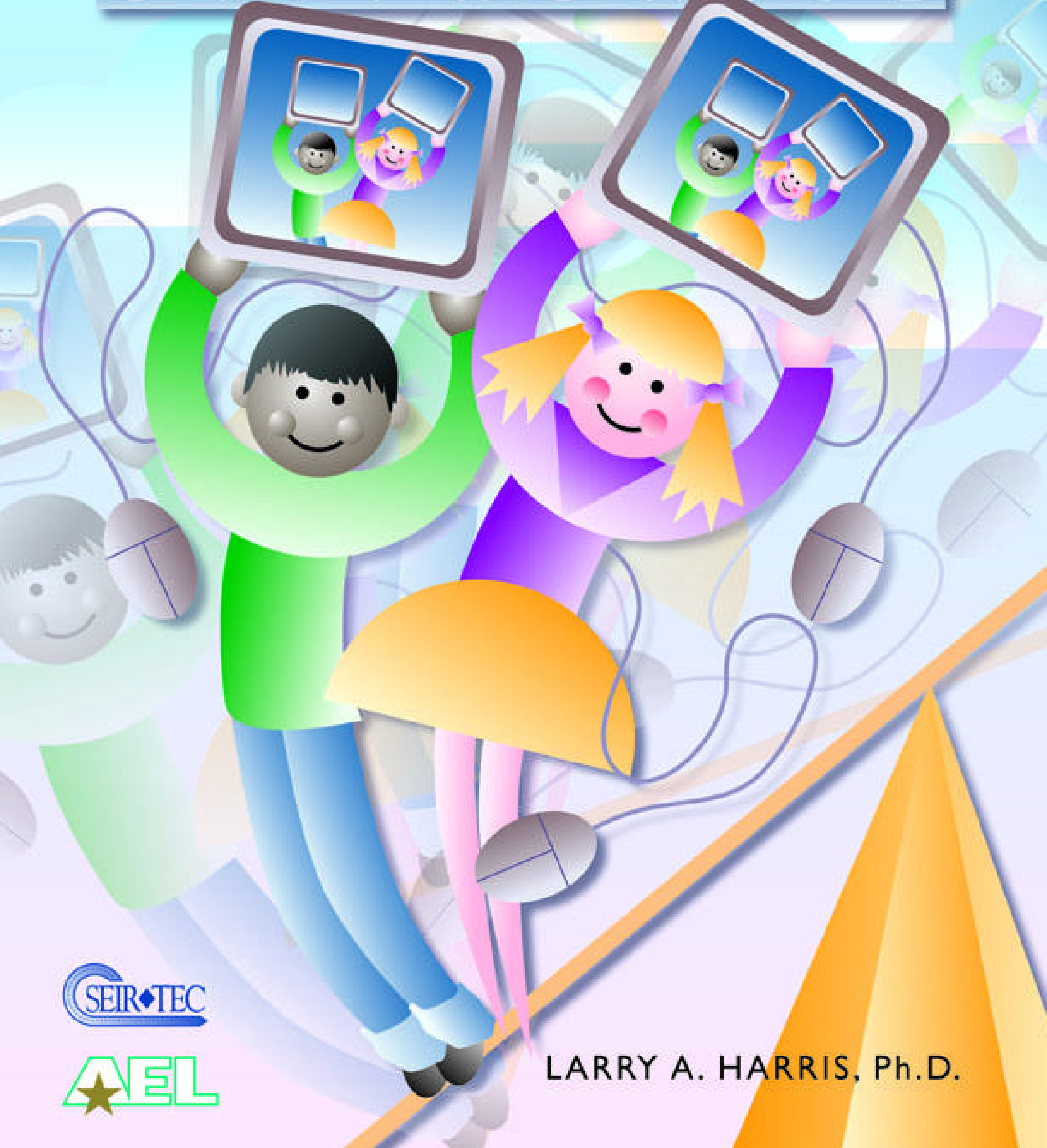
PATTERNS OF PROMISE



SEIR◆TEC

AEL

LARRY A. HARRIS, Ph.D.

Patterns of Promise

Larry A. Harris
Virginia Tech

AEL's mission is to link the knowledge from research with the wisdom from practice to improve teaching and learning. AEL serves as the Regional Educational Laboratory for Kentucky, Tennessee, Virginia, and West Virginia. For these same four states, it operates both a Regional Technology in Education Consortium (SEIR◆TEC at AEL) and the Eisenhower Regional Consortium for Mathematics and Science Education. In addition, it serves as the Region IV Comprehensive Center and operates the ERIC Clearinghouse on Rural Education and Small Schools.

AEL operates the Technology Consortium under a subcontract with the SouthEast and Islands Regional Technology in Education Consortium (SEIR◆TEC)—one of six regional technology consortia established by the U.S. Department of Education to accelerate school reform initiatives through the integration of advanced technologies into the instructional process. SEIR◆TEC at AEL provides technology-related assistance through awareness presentations, policy development and planning, staff development, and evaluation.

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AEL

Post Office Box 1348
Charleston, West Virginia 25325-1348
304-347-0400
800-624-9120
304-347-0487 (fax)
aelinfo@ael.org
www.ael.org

SEIR◆TEC at AEL
Tammy M. McGraw, Director

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Contents

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Preface

On almost a daily basis, a newspaper or professional journal will describe how technology is infiltrating schools. Most articles view this trend positively, assuming that technology will change schools for the better. Here and there, someone worries out loud that these changes may not be taking us in the right direction, but conventional wisdom says computers are good for schools—that children will learn better if they have access to computers. The reasoning is that computers will *cause* schools to improve, indeed, that computers will serve as a *change* agent.

I've always been intrigued by questions of cause and effect. Something that seems obvious to others is not always so obvious to me. I guess I've come to believe that most things are more complex than they seem. For example, I just watched my beloved Minnesota Vikings lose a game the Las Vegas oddsmakers thought they would surely win. Why did they lose? The post-game commentators have ready answers. One analyst argues the Vikings lost because of injuries to key players; another says they lost because an official made a bad pass-interference call. But it occurs to me the Vikings lost for a host of reasons. I remember the injuries and the pass interference, but I also recall missed tackles, fumbles, other penalties, and a lack of emotional intensity. Who can say for sure what caused the Vikings to lose? The true cause-effect relationship in many human events is just as complex. I have a hunch that the most obvious solution isn't always true, but human beings like quick, often simple, answers.

I'm just as skeptical about the link some people make between computers and school reform. The situation is complex. I'm not disputing that schools must infuse technology into the classroom, but I doubt that computers are the "magic bullet" of school reform.

I wonder if people who believe technology will reform education have the cause-effect relationship going in the right direction? Is technology really the *cause* of school reform? Will schools change *because* technology is added? I'm not talking about changes like using presentation software to spice up a lecture; I'm talking about reforming the basic learning environment, especially the learning activities created by the teacher.

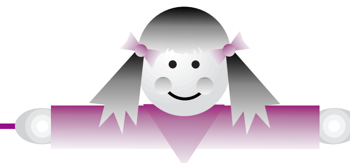
Let me be clear in saying that technology can be a powerful facilitator of change. To be metaphorical, technology can be a lever in the change process, but a lever isn't much good without a fulcrum. In my view, the fulcrum is the teacher's basic beliefs about the *nature of learning* and the *role of the teacher*. When teachers become dissatisfied with their approaches, they may be ready to use computers and other forms of technology in a way that changes the teaching/learning equation. Unless a teacher feels that need, unless the teacher reasons that a change is needed, having a computer at every desk is not going to change the nature of the learning environment. Until then, the technology will be absorbed into the school environment like radio, television, and every other innovation, without changing the basic grammar of schools. Technology does not *cause* change; technology *supports* change. The *effect* is, or could be, a classroom where children are actively involved in learning—solving problems that intrigue them, pursuing personal interests, and taking responsibility for their own learning.

The good news is that computers have enormous potential for rearranging the roles of learners and teachers. Stated somewhat differently, schools and classrooms will not change very much if educators use computers simply to support rote memorization or make information easier for students to access. Change will occur only if teachers see computers as a means to a different end. My beliefs about the connection between technology and effective school reform will be apparent in how I describe the programs.

The Perspective of a Nontechnologist

I don't claim to be an expert on computers or technology, but I believe I know something about schools and school reform. I'm a teacher. Actually, I'm a teacher of teachers, and my specialty is reading education. This may prompt some people to conclude I'm not a good choice to tell how 12 programs have used technology in an exemplary manner. You'll have to make your own judgment about that; however, it may be advantageous that I'm *not* a technologist. It allows me to stand outside the trend toward greater use of instructional technology. The cause-effect relationship others see between technology and school reform is not so obvious to me, so my interpretations may be a bit more objective.

Acknowledgments



I want to express thanks to Tammy McGraw, a friend and Director of Technology and Innovation at AEL, Inc., who launched this project. Not only did she have confidence in me to do the job, she provided invaluable feedback on the manuscript as it began to emerge. John Ross, Instructional Technology Specialist at AEL, Inc., was helpful throughout the process, offering suggestions and encouragement. My lifelong friend and colleague, Jerry Niles, Associate Dean of the College of Human Resources and Education at Virginia Tech, read the manuscript and offered suggestions that helped me find the "patterns of promise." I also want to express very special thanks to the coordinators of the 12 exemplary programs. Critics who worry and complain about the state of schools would have a different perspective if they sat in the classrooms of professionals like Susan Kirkpatrick, Brenda Bleigh, Mary Robertson, and Geneva Storey and observed the work of administrators like Judy McDowell and Ric Potts. These people are dedicated to carrying out their work in the face of enormous obstacles and acrimonious debate about the quality of public education. In my judgment, all of us are fortunate that these dedicated educators stay in the trenches and press forward against enormous odds.

Overview

Patterns of Promise describes exemplary uses of technology in several schools in the southeastern United States. Educators throughout the region were invited to nominate programs that demonstrate effective uses of technology for instruction. A panel of experts chose the 12 most outstanding examples of technology use (see Appendix A for selection criteria). Please note that not all of these examples come from large, well-to-do urban or suburban schools; small rural schools and schools with a large percentage of students eligible for free or reduced-price lunch take creative and innovative approaches to using technology and finding funding.

Chapter 1 describes five programs that take a project approach to learning. This approach comes in various flavors but is characterized by inquiry. Students pursue answers to a question or questions that are not limited by traditional academic lines (i.e., the answers go beyond a single discipline). Technology can support student inquiry in such programs. Its power to extend and expand student access to information is an important strength of technology. Technology also enables students to present their findings in interesting and useful ways.

Spanish at Fulton for Everyone is a program in which high school students teach Spanish to elementary students in the rural western Kentucky community of Fulton. One Heart allows second graders in the small central Kentucky town of Stanford to use desktop publishing to produce and sell greeting cards and novelties. Primetime gives fifth and sixth graders in urban Memphis an opportunity to prepare and broadcast news reports over an in-school television network. STARS (Students Thinking, Analyzing, Reflecting and Solving), a middle school program in Maryville, Tennessee, enables teams of students to learn subject matter while pursuing the answers to personally meaningful questions. Finally, TOTS II simulates a publishing company, with Memphis second graders as employees.

Chapter 2 describes four programs designed to increase teacher competence with technology. These include the Teacher Technology Competency Project (Poquoson, Virginia), the Central West Virginia Technology Upgrade for Educators (Burnsville, West Virginia), WebQuests and Online Projects (Jefferson County, Kentucky), and Technology Teaching Educational Alternatives for Mainstream Students (north central Florida).

Chapter 3 describes examples of systemic change that are broad in nature and offer a new paradigm for schooling. The Center for Applied Technology and Career Exploration in rural Franklin County, Virginia, has changed the nature of teaching and learning for all eighth graders in an entire school district; The Florida High School provides on-line courses for students throughout an entire state; and Computing Seniors/Computing Parents in Roanoke, Virginia, offers lifelong learning experiences for all citizens in a midsized southern community.

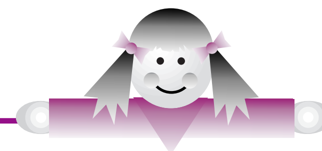
Each program description addresses some or all of the following:

- details of the programs
- nature of the school and community
- technology use
- amount and source of funding
- partnerships and community relationships
- outcomes
- challenges

This book is intended to inspire readers to find out more about each program. The descriptions provide contact information and, if applicable, Web addresses for the programs.

The final chapter extracts "patterns of promise," a series of generalizations about programs that could have implications for educators in other locations. The intent of this summary is to address a few key questions: Taken as a whole, what meaning can we make of these exemplary programs? How can the programs guide educators and others who are wrestling with the universal expectation that technology will be infused into the classroom? What are the patterns of promise?

Introduction



When reforms fail, the reasons usually are well documented and understood by the educators involved. Michael Fullan and Susanne Stiegelbauer, Philip Schlechty, Seymour Sarason, John Goodlad, Ernest House, and others have written extensively about why school reform does not last or does not lead to the intended results.[1] One point of agreement is that well-intentioned people who are external to the situation often *impose* reform on schools. Their suggestions for school reform may be simplistic and ignore the complexity of schooling in American society. Further, reform ideas with genuine promise are too often lauded as cure-alls and transplanted to other locations without sufficient attention to nurturing the conditions that made the ideas successful in the first place. Countless examples range from the adoption of new curricula—such as the new math of the ’60s and the new, new math of the ’90s—to the creation of learning communities, the implementation of block scheduling, the use of high stakes testing, and the adoption of authentic measures.

Panaceas and quick fixes for education are not realistic. Many people see instructional technology as one of these “quick fix” strategies. Every day, the media tell us about new and better uses for computers—things our children will need to know when they leave school for work. As a nation, we’ve spent billions of dollars to purchase and install the infrastructure to support this technology in our schools.[2] Surely we’ve begun to lay the groundwork for student success. I believe we can say this is true, with one important caveat: If computers are imposed on schools without sufficient understanding of school change, the process will surely fail, and we will have squandered an opportunity for lasting change.

Before going any further, I’d like to address a basic issue: when people use the term *technology* in connection with schools, do they actually mean *computers*? Are these terms synonymous? Even those of us who are not technology experts realize the answer is “no”; however, in common usage, the words are frequently used interchangeably. Technology is a broad term that extends well beyond computers. It conveys nearly the same meaning as *tool*, but even that definition is a bit narrow. Technology applies to all kinds of devices, from farm implements to catalytic converters, and it can describe a particular body of knowledge, such as a legal system, or even a learning approach, such as constructivism. The growth of modern civilization might even be viewed or explained as a function of technological advances.

In common education vernacular, technology refers to computers and the various peripherals associated with them: printers, scanners, disk drives, etc. The 12 exemplary programs all use computers, some rather extensively, and only one program uses another type of multimedia equipment (videotape recording) as the fundamental technology. Because the expert panel closely equated computers with technology, the terms are interchangeable in this text.

Returning to the issue of school reform, everyone wants better schools, and most believe greater use of technology is at least part of the answer. Some think learning about technology is an important goal in itself—children must become competent with technology to be well educated. The International Technology in Education Association for example, recently released standards defining what students should know about technology.[3] Others believe technology is important primarily because it can improve instruction and learning—making vast stores of information available and providing authentic problem-solving opportunities.[4] Neither view excludes the other. Both are important, but classroom teachers who have been told to use technology, regardless of whether it aligns with their instructional plans, could be forgiven for thinking that the means and the ends have gotten confused. Few veteran teachers were taught in their preparation programs to use technology, and schools were not created to teach just technology any more than they were established to teach only reading or mathematics.

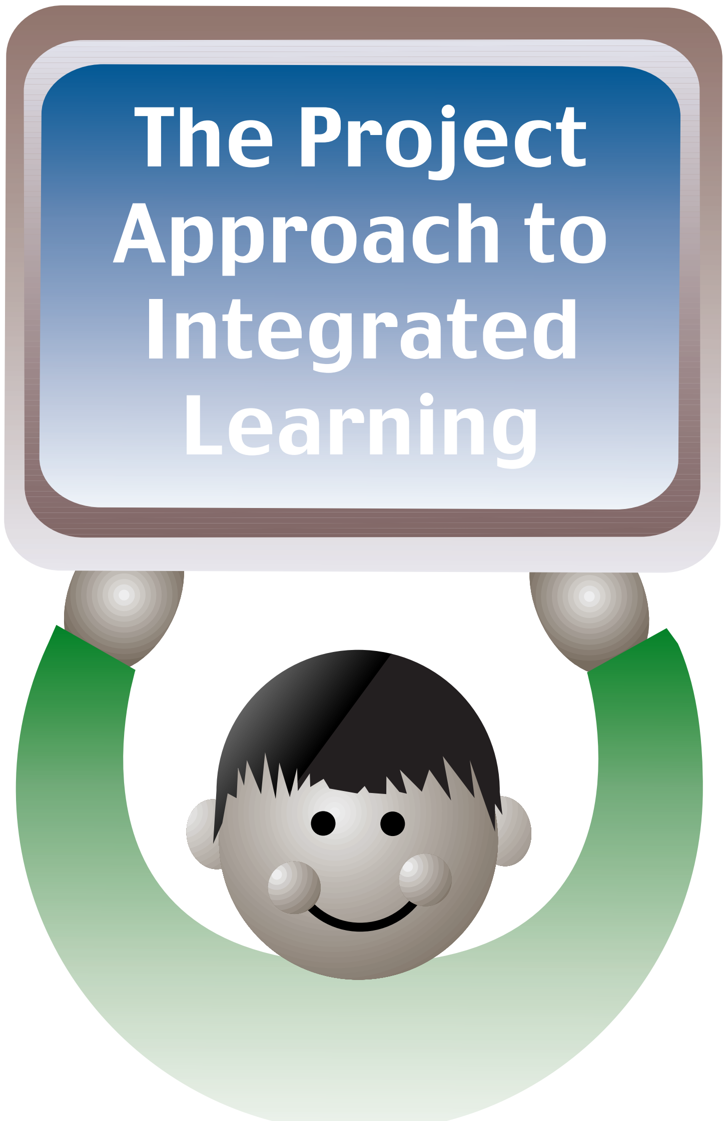
The importance of creating a technology infrastructure cannot be overemphasized. Without easy and regular access to computers, it is senseless for teachers to plan lessons requiring children to use the Internet or prepare reports with presentation software. No one would argue with this assertion because it is obvious to the point of being axiomatic.

Because of recent efforts to upgrade technology, very few schools in the United States are totally without computers.[5] Enormous differences exist, however, from community to community and from school to school within the same community. Some schools described in this book enjoy a ratio of one computer for every two students. Others have a higher ratio, but none are entirely without computers.

In schools where the number of computers has increased significantly, the main infrastructure problem has changed from not having enough computers to being saddled with obsolete computers. Given the pace of technological changes, this problem seems inevitable and ongoing, but it is surely better to have obsolete computers than no computers at all or a very high student-to-computer ratio.

Technology has enormous potential for improving education. This potential will not be realized quickly or easily. Schools will necessarily invest time and energy, not to mention large amounts of funds, to capitalize on the value of technology. The following descriptions offer a look at how some educators are responding.

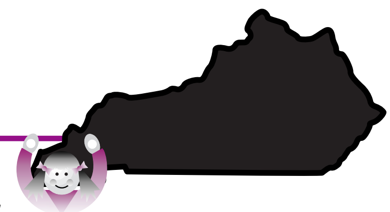
Chapter 1



Learning activities are usually structured by specific subjects: math, science, reading, and so forth. This traditional approach is most familiar to us, yet others pursue the same goals and content in nontraditional ways. One such method is the project approach to learning.

The project approach integrates subject matter as a problem or examines an issue from various perspectives. Learners typically pursue answers to questions that cut across traditional academic lines. Projects can be contrived or real but usually result in a final product—written report, model, mural, graphic representation, performance, bulletin board, poster. Learners often work in teams and take active roles in the project and in preparing the final product, drawing upon a variety of resources.

Spanish at Fulton for Everyone (SAFFE)



SAFFE serves as a marvelous example of bottom-up innovation. This program was not imposed from the state capital, nor was it implemented simply to raise scores on an annual achievement test. It was developed at the local level to respond to a local need, and it does so respectfully, entrusting students to help other students. It is voluntary in nature and makes learning active and applied for students. Technology is used in a sensible way without controlling or interfering with the goals of the program. Sometimes, someone does get it right.

As noted earlier, reform imposed on schools from outside often fails. In contrast, reforms initiated at the classroom or school level have a much better chance of succeeding for the simple reason that the teacher, individually or in collaboration with other teachers, creates the change.[1] Change is effective when it responds to a need felt locally by the people who are closest to the situation. SAFFE illustrates how school improvement can happen when a classroom teacher seizes an opportunity to make learning better.

E. J. Woods is an athletic 17-year-old enrolled at Fulton High School in Fulton, Kentucky. He attends a Spanish IV class each morning for the usual vocabulary and grammar study that many of us remember from our own high school days. In addition to preparing for his daily Spanish class, E. J. also teaches Spanish each week to first graders at Carr Elementary School. Working within the framework of a program planned cooperatively between the high school Spanish teacher and the elementary school teachers, E. J. develops and e-mails a lesson plan to first-grade teacher Cathy Burrow every Tuesday. She reviews the lesson plan and sends suggestions back to E. J. by e-mail. Each Friday, E. J. goes to Carr Elementary School and teaches the lesson. Mrs. Burrow monitors E. J.'s teaching and e-mails feedback to his high school Spanish teacher Geneva Storey.

E. J.'s story could be repeated for each of Geneva Storey's 20 Spanish III and Spanish IV students, who all participate in this program, which runs from January through May. She created the program in 1998 in response to the needs of her local community.

The School and Community

Rural Fulton Independent School District serves a high percentage of at-risk children: 45 percent receive free or reduced-price lunches. Carr Elementary has an enrollment of 480; Fulton High enrolls 176. A large percentage of the high school students enroll in basic Spanish classes and some go on to take Spanish III and IV.

When a new industry opened in the Fulton area, migrant workers arrived seeking employment. Their children spoke fluent Spanish, but the teachers in Fulton did not, which created a challenge for teachers and students.

Some people might have interpreted this situation as a one-way street, forcing the Spanish-speaking children to abandon their native tongue in order to fit in. Geneva, however, saw this potential problem as an opportunity—actually two opportunities. First, she realized the migrant children's native language was a valuable asset that could enrich the educational experiences of *all* children in Fulton. Her plan was for the English-speaking children to learn Spanish while the Spanish-speaking children learned English. Geneva saw a chance to provide the time and repetition needed for young children to learn a foreign language using the neurological connections young children make so readily. Further, she believed the focus on language could be used to learn more about other cultures.

Geneva created a second opportunity that allows her advanced high school Spanish students to apply what they learn in the classroom to a real-world situation. In addition to helping the Spanish-speaking children communicate with their teachers and classmates, her students teach Spanish to the Fulton natives.

Technology Use

This program would have provided a powerful learning experience for all parties even without technology, but Geneva sought to enrich it through a collaboration with her colleague Dianne Owen, Technology Coordinator for Fulton Schools. Geneva and Dianne linked the high school students and the elementary school teachers through e-mail, providing the means for reviewing and approving lesson plans and journals electronically. They also encouraged the high school students to incorporate cultural information from the Internet into their work and use the software package JumpStart, a multimedia program organized around interactive games and puzzles that support curriculum.

Funding

The SAFFE program illustrates that a relatively small amount of money ($1,530) can support a powerful approach to learning. Fortunately, the infrastructure for the computer aspects of the program was already in place, supported through the 1990 Kentucky Education Reform Act (KERA) and the state's $500-million-plus commitment for infusing technology into public education. The local school system matched state funds dollar for dollar and also applied for E-Rate funding from the federal Universal Service Fund. This produced $300,000 over five years to develop a districtwide network. By the time SAFFE was initiated, computers and Internet connections were already in place, and teachers had been trained in technology. Therefore, the cost of one additional computer gave 330 students a chance to participate in a worthwhile and effective learning experience. In a very real sense, the SAFFE program has leveraged the initial investment for technology to make learning cross disciplinary and apply in a personal and meaningful way for Fulton students of all ages.

Outcomes

The focus on Spanish at Carr Elementary School has had a noticeable effect. Language study permeates the school. Early in the week, students use computer software to listen to Spanish-language songs and practice new vocabulary. Spanish cuisine is served periodically in the school cafeteria, students in all grades have a Spanish word-of-the-day, and labels for objects throughout the school are written in Spanish. Art and music teachers include Hispanic artists in their curricula, and on Friday, high school students visit the elementary school to teach their lessons.

As a result, interest in Spanish is on the upswing at Fulton High School. Enrollment in Spanish classes has increased, and students have enjoyed success at the annual regional foreign language contest. It is noteworthy that participation in SAFFE is voluntary and its increase indicates the program is working well.

Any school improvement effort benefits from occasional celebrations and public recognition of success. SAFFE ends each 15-week cycle with a schoolwide fiesta, in which the elementary school students perform songs and dances for the community. SAFFE displays posters and samples of the children's work and recognizes the contributions of participants.

Evaluating the success of innovative programs is always a challenge. How successful has SAFFE been? The Kentucky Comprehensive Assessment System does not measure growth in Spanish knowledge. Informal measures, however, suggest the program is succeeding. These measures include the high school students' journal entries about their teaching experiences, as well as the Spanish knowledge the elementary students have demonstrated at the fiestas.

Challenges

SAFFE is addressing several challenges encountered during the first year of the program. These hurdles include coordinating the schedules of many people, which is difficult within a single school, but even more challenging when two schools are involved. Accordingly, time management is at a premium. The innovative nature of the program requires all participants to spend substantial time creating learning materials.

Even though the budget for this program is modest, funding remains a constant challenge. Managing several funding sources complicates the budget, and obtaining approval for expenditures is more difficult because two schools are involved. But experience is helping SAFFE handle these challenges more efficiently.

How willing are decision makers and others who set education policy to look at alternative forms of assessment, including student journals and student performances at fiestas? In other words, will decision makers consider evidence that has not been generated by paper-and-pencil tests—nonquantitative evidence? If not, educational innovations like SAFFE will wither on the vine. More will be said in Chapter 4 about the need for educators to gather and present nontraditional evidence concerning the impact of technology and the success of reform efforts. It seems appropriate to note that considerable evidence suggests that SAFFE does make a positive difference. With or without test scores to prove the point, good things are happening in Fulton because of SAFFE.

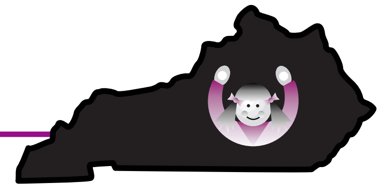
For more information, contact

Geneva Storey
Fulton Independent Schools
Fulton, KY 42041

gstorey@fulton-ind.k12.ky.us
Phone: 502-472-1741
Fax: 502-472-6135

Dianne Owen
dowen@fulton-ind.k12.ky.us

One Heart



One Heart is a simple idea with enormous appeal as a vehicle for learning. The underlying principles and ideas can be adapted to fit almost any school. One Heart builds upon some important notions about learning: active, hands-on learning experiences are more effective than passive experiences, and concepts with direct applications are meaningful and relevant to children. Further, One Heart is not costly and does not depend heavily on sophisticated technology. Yet technology is used in a way that offers direct application of computer skills and expands the types of "businesses" that might be established.

The American Greetings Corporation is headquartered in Danville, Kentucky. Like Hallmark, Americards, and other greeting card companies, American Greetings faces daily competition, but an unlikely competitor has emerged from the small rural community of Stanford, Kentucky.

On some special occasions, Stanford residents now have a choice when they want to send a greeting card. They can buy something produced and distributed by American Greetings or place an order with One Heart, a company managed by two classrooms of primary students, under the guidance of teachers Susan Kirkpatrick and Pam Cox. American Greetings has shown no inclination to worry about the new competition, but things may change as the 7- to 10-year-olds gain greater market share, or learn their multiplication tables, whichever comes first.

This competition is more imagined than real because American Greetings knows about and endorses One Heart. In fact, American Greetings cooperates with the program to make it the best learning experience possible for children at Stanford Elementary School. One Heart exemplifies the cross-curricular, problem-based, active type of learning activity that technology can support. It engages primary-grade children in learning activities connected closely to the types of work-related tasks they will encounter in the world outside school.

Susan Kirkpatrick gives a glimpse inside One Heart: "Picture this . . . seven-year-olds gathered around computers designing advertisements for a product created by their 'company.' Or, nine-year-olds holding a discussion about how much of the company's profits should be reinvested into the business and how much should be spent on new playground balls! It happens at One Heart."

Three times a year, the children create, produce, market, sell, and deliver bona fide greeting cards and novelty items to members of their school community. In the first year of the program, the October sales campaign featured pumpkin cards and candy with the theme "You're the Pumpkin in My Patch." In February, the company sold a can of Crush soda with "I've Got a Crush on You" greeting cards. In May, snapshots were taken at recess, framed, and delivered with the theme "Summer Shots." The main customer base is the other children at Stanford Elementary School, which enrolls nearly 600.

In the process of running their business, the children learn and practice a number of important skills and concepts. They also acquire and apply practical knowledge. For example, when hundreds of orders flood in, the children need an authentic method for handling the information. Materials must be ordered and orders must be filled, which requires students to manipulate numbers in various ways. Part of the solution is to enter the information into a computer-based spreadsheet. The teachers use this as an opportunity to teach graphing. Working with numbers that represent something very real conveys to students that mathematical operations have practical value.

In the same vein, children study greeting card verses as they decide what to include in their products. The teachers approach this as a series of lessons related to poetry. Students study spelling and grammar and use computers for word processing in preparing advertisements for their business. They learn basic economic principles by developing a budget that includes the cost of supplies and their potential income. From this study, they use computer-based spreadsheets to decide what materials to purchase. They also study advertisements in the mass media to get graphic design ideas as they plan their own sales campaigns. Again, computers come into play as they design graphics and art.

The School and Community

Stanford is a small town of about 2,700 people located 65 miles south of Louisville. Many residents work for the American Greetings Corporation just 12 miles northwest of town. Stanford Elementary serves a diverse population with children of all socioeconomic levels.

Technology Use

Technology is an important and natural component of One Heart, involving desktop publishing, scanners, printers, and digital cameras. The children use computers to record their experiences in electronic journals stored on their own floppy disks. These journals are turned into booklets and placed in the reading center so others can learn about the project. Students use the Internet extensively to explore the American Greetings Web site and those of other relevant companies. E-mail allows students to correspond electronically with customers regarding their orders and with employees of commercial greeting card companies.

Funding

Many of the programs described in this book have received technology-related funding from various state and federal grants. In contrast, One Heart received an initial grant of $1,317.30 from school-to-work funds provided by the U.S. Department of Labor. Previous school-to-work projects at Stanford Elementary had helped create career awareness; One Heart has taken the next step. Such an approach is consistent with the theme of the federally sponsored School-to-Work program, which promotes opportunities for all students to participate in performance-based education and training programs (visit http://www.stw.ed.gov/factsht/act.htm). The One Heart program begins, even at an early age, to combine community and school resources to teach children the value of work and to give them real-world tasks.

Community Connections

One Heart emphasizes helping children learn about the business world. Children learn that a business must provide a product or service that appeals to customers *and* at a price they are willing to pay. Additionally, products must be delivered to the right person on time. These lessons are reinforced by visits to local merchants, where children learn how a flower shop takes orders and makes deliveries, how McDonald's provides customer service, how Food Lion handles merchandise, or how Wal-Mart orders and displays greeting cards.

Parents and other guests associated with these businesses visit the classroom to share their experiences and answer children's questions. For example, Debbie Gastineau, a merchandiser for American Greetings, has made classroom presentations about working with local merchants and setting up card displays in town. Other presenters have included a maintenance supervisor, a plant engineer, and a part-time Wal-Mart employee.

Susan Kirkpatrick emphasizes the importance of community involvement in nurturing students' business and economics sense. Rather than mimic existing business practices, however, she encourages the children to chart their own paths: "Our ultimate long-range goal is that our students, through their own experiences, will gain an understanding of business concepts and will begin to define their own role in the work world."

Outcomes

One Heart was launched during the 1998-99 school year; profits earned during the first year funded a second year. A program of this sort has great potential to grow and develop vitality. For example, in the second year the children made an important business decision. As the February sales campaign approached, they noted that sodas were cumbersome and required special handling. It was difficult to keep the sodas chilled right up until delivery time. The children discussed these demands at a company meeting and decided it made "business sense" to sell a different product, one that required less labor. In place of sodas, they switched to heart-shaped lollipops and adopted a different Valentine's theme: "Happy Hearts."

How does Susan Kirkpatrick evaluate the success of One Heart? One criterion would delight those who want schools to be more businesslike: does the program make a profit? Another businesslike standard she uses is whether orders increase from one sales campaign to the next. She interprets success in these areas as evidence that the advertising campaigns have succeeded and that the customers have judged the products to be a good value. Few educators would, or should, be willing to judge a school program on the basis of whether it produces a profit, but this approach seems to fit the purposes of One Heart. While profit and sales increases are not traditional measures for most educational programs, they are better indicators of this program's success than student performance on a standardized achievement test that doesn't address creative problem solving, collaboration, and initiative.

Susan has the courage to suggest that teacher observations and class discussions during company staff meetings are good indicators of success. These anecdotal records allow her to note a child's level of involvement and how well her students understand what she has been trying to teach. These measures are qualitative, but they illustrate an important principle that will be discussed in Chapter 4: innovative programs may need to be evaluated in ways that are sensitive to their special goals. Can gains in student achievement be demonstrated? The answer to that question is related directly to deciding what evidence one values.

Susan's own words are helpful in understanding her notion of expanded ways to evaluate the effects of One Heart: "This project has produced a group of young students who discuss supply and demand, who use technology as a tool to help achieve their goals, who apply content area skills in every phase of their business operation. Most importantly, this project has created a group of children who have experienced success firsthand, and now have the confidence to succeed again and again. That is what I value as their teacher."

Challenges

Teachers are sometimes reluctant to undertake a program such as One Heart because they feel pressured to "cover the curriculum." This is especially true as more states move toward a standards-based approach, which places a premium on studying the "right material" so children will do well on high-stakes tests. Project-based learning may seem risky in this context because it is less structured and more far ranging. Susan explained that One Heart does not sacrifice standards but simply addresses them in a more holistic way. She notes that One Heart directly addresses the National Educational Technology Standards developed by the International Society for Technology in Education (ISTE), as well as the national standards in other content areas, and Kentucky's Learner Goals. She explains: "This project is so cross-curricular in nature that it addresses a multitude of state and national standards, but focuses on the children and the instructional strategies that are most appropriate for younger learners."

Susan is confident her students still learn the basics, but they learn them differently—a way she thinks is more effective. She is convinced her students will do well on traditional paper-and-pencil measures. The instructional activities in One Heart could be tied to a set of curricular standards if necessary, but she believes the best evidence of success comes in other ways.

Project-based learning takes many forms. Technology is neither incidental nor central to the success of One Heart, but it certainly supports and strengthens this innovative approach to learning. For a relatively small amount of money, Susan Kirkpatrick and Pam Cox have used technology to reform their instruction.

For more information, contact

Susan Martin Kirkpatrick
Stanford Elementary School
Lincoln County Public Schools
101 Old Fort Road
Stanford, KY 40484

skirkpat@lincoln.k12.ky.us
Phone: 606-365-2191
Fax: 606-365-1533
URL: http://www.lincoln.k12.ky.us/stanford

Primetime

Primetime is an excellent example of how technology can change the way learning activities are approached throughout a school. Technology is used because it supports learning rather than because it is trendy.

Imagine it's early morning, and you've just entered an elementary school in Memphis, Tennessee. You notice the classroom doors are closed; the hallway is empty and silent. Seem a bit odd? Something special must be happening today at Idlewild Elementary School.

You peek inside several classrooms. Children are sitting at their desks watching television with rapt attention. You ask yourself, "Has Channel One Television taken over? Will the next program feature *Regis and Kathie Lee* or *Oprah*?"

Upon further investigation, you learn the children are watching a broadcast about the Idlewild school community. Richard (Ric) Potts, the school principal, explains that the television program not only depicts activities at Idlewild, it was produced and directed by the school's fifth and sixth graders. Move over Tom Brokaw. Step aside Diane Sawyer. Welcome to "Primetime."

Primetime is a student-managed television station that broadcasts school-related news and feature stories throughout Idlewild using a video network called Eaglevision. Eaglevision connects all classrooms to a central "studio," which houses equipment used to produce and edit videotapes shown on Primetime. Students in grades five and six act as the employees of Primetime, performing all tasks related to producing and presenting regular video broadcasts. (These broadcasts had been weekly, but recent personnel changes at Idlewild have temporarily reduced the frequency.)

Students serve as reporters, news anchors, camera operators, editors, producers, and, of course, viewers. Any broadcast might include classroom news, messages from the school principal, school safety tips, information about school events, student features, descriptions of other events taking place on the school grounds, news about field trips, descriptions of curriculum-related activities, PTO information, or interviews.

A teacher coordinates the program and oversees tasks associated with the broadcasts, including care and maintenance of the equipment. Fortunately, both people who have served in this role had previous experience in commercial television.

Like the other programs in this section, Primetime is project based. The Idlewild program also includes *simulation*, incorporating nearly all the features of an authentic workplace: a television station. Primetime has a legitimate academic purpose as well. Activities address Memphis City Schools' curriculum standards in English/Language Arts. Students apply various communication skills—especially writing, reading, speaking, and listening—while learning and practicing decision making, problem solving, creativity, and flexibility.

Primetime also provides an outlet for classroom curriculum projects. Reporters frequently interview students and teachers concerning classroom activities in science, social studies, and other subjects. This has led to the video production of documentaries, plays, reenactments, debates, displays of student learning, critiques of literature, and panel discussions. Primetime permits mass viewing of videos devoted to topics of community interest. Examples include the citywide barbecue festival in May and the annual Memphis "Focus on Africa" in April.

Several recent curriculum projects illustrate Primetime's potential power to make student work more visible. One videotape grew out of Black History Month activities. Second-grade teacher Ms. Rumage introduced a curriculum unit on the life of Martin Luther King, Jr. She discovered her students knew little more about him than the fact a holiday honors his birthday. Ms. Rumage helped students research Dr. King's life, and with this information, they role-played important events, writing their own scripts and videotaping the performances. The vignettes were edited into a documentary on the life of Dr. King, and the tape was broadcast over the Primetime network. Watching the documentary inspired other children to develop similar projects in their own classrooms.

Another project grew from the America Goes Back to School program promoted by U.S. Secretary of Education Richard Riley. In connection with the city's Memphis Goes Back to School program, city leaders, corporate executives, and CEOs of local businesses visited Idlewild. During their visit, Primetime reporters asked about their personal memories of school. The idea evolved into conducting similar interviews with accomplished individuals who had attended or worked at Idlewild. The Primetime reporters gathered photos of the school over the years and conducted oral histories; the product was a documentary video about the history of Idlewild with the current principal and several former principals, teachers, and students that was broadcast to the entire school. This history helped create a sense of community at Idlewild and became a tremendous source of pride for everyone. The documentary is used to orient new teachers, visitors, students, and parents to the school.

Students developed another project around the theme of school safety. Following the Columbine tragedy, Primetime reporters interviewed the Idlewild principal on camera, asking about safety and security measures and procedures to be followed in case of an emergency situation. The principal explained contingency plans, how teachers have been trained to handle various situations, and how security is maintained. WMC-TV5 news in Memphis picked up the story and ran it as an example of how local schools were responding proactively to provide safe learning environments and reassure students and parents.

The School and Community

Idlewild Elementary is a very old school, built in 1903, but it has a warm, inviting atmosphere. This urban school has a minority enrollment of 65 percent, and 51 percent of students qualify for free or reduced-price lunches. The school has a science and technology focus, was a Tennessee 21st Century School, and was one of two Memphis schools chosen to be a New American School Co-NECT demonstration site.[2]

Technology Use

While television broadcast technology is important to the Primetime program, Idlewild students make extensive use of other technology as well. Computers, in particular, are used for everything from collecting information, to analyzing and evaluating data, to preparing stories for broadcast, to developing on-screen graphics. Professional touches are added to broadcasts through the use of camcorders, videocassette recorders, background music, and special graphics.

The technology benefits the teachers as well as the students. Eaglevision, the Idlewild broadcast network, has been used to deliver professional development. For example, training in technology use has been broadcast throughout the building, and in a recent program, television monitors demonstrated instructional uses of the Internet.

Funding

Like the other programs in this book, a primary challenge is finding resources to create a technology infrastructure. Idlewild built its infrastructure over time by piecing together funds from various sources. Total costs for Primetime are estimated at $110,000. Goals 2000, a competitive grants program intended to raise student achievement, contributed $44,000. The matching money requirement was satisfied by in-kind contributions from several sources, including WMC-TV5 ($5,400), a 21st Century Classrooms grant from the Tennessee State Department of Education ($15,000), and local school funds from carnivals and other fund-raising activities. All were one-time appropriations except for the local funds.

Primetime built upon a partial technology infrastructure that already existed. The building had been wired with computer drops in all classrooms, and 10 of the 28 classrooms had been equipped with computer technology thanks to funds from Tennessee's 21st Century Schools Program. That legislation was part of Tennessee's Basic Education Plan and included funds intended to bring every classroom in the state up to par in technology. This included Internet connections and four computers per classroom as well as 32-inch television monitors, camcorders, videocassette recorders, laser disc players, printers, and digital cameras.

Partnerships

Partnerships are often important in innovative programs and this is certainly true of Primetime. To receive funding from the 21st Century Schools Program, projects are required to collaborate with partners. Memphis television station WMC-TV5 has been an important partner for Idlewild. In fact, TV5 has adopted Idlewild School, serving as a destination for occasional field trips. Channel 5 anchor Joe Birch, who has two children enrolled at Idlewild, has volunteered personal time to training school announcers on "tricks of the trade." Also, technicians from the television station have helped train and maintain the video equipment. In the words of one teacher, "It's a partnership made in heaven."

Parent involvement also plays a big role in the video network. Parents act as volunteers, chaperones, cosponsors, advisors, and support personnel. Over the past few years, Primetime has created a video library of past broadcasts available for checkout. Parents borrow the videos to see their children in action and find out what is happening in the classroom.

Challenges

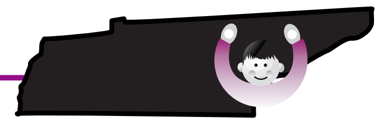
Primetime is in its third year and has become a permanent part of the Idlewild environment. Ric Potts and his teaching staff have encountered some predictable challenges. Like any ambitious program added to crowded classroom schedules, preparation and communication among all parties requires constant attention. Coordination of the program has been demanding, especially with turnover in key teaching positions. Technical failures are inevitable when using sophisticated equipment, which is especially inconvenient when children are eagerly awaiting a chance to carry out an assigned activity. Enormous amounts of time are required to plan, shoot, and edit the programs. Students and instructors have faced these challenges head on.

For more information, contact

Richard (Ric) Potts, Principal
Idlewild Elementary School
Memphis City Schools
1950 Linden Avenue
Memphis, TN 38104

pottsr@co-nect.memphis-schools.k12.tn.us
Phone: 901-722-4566
Fax: 901-722-4492
URL: http://co-nect.memphis-schools.k12.tn.us/Idlewild

STARS (Students Thinking, Analyzing, Researching and Solving)



Successful learning is closely linked to interest. Students become energized when they are interested in a topic or idea. Effective teachers understand the value of student interest and look for ways to help learners make connections between what they know and what society wants them to know. It is possible and often desirable for teachers to share control of classroom activities with interested learners. Under these conditions, children's natural preference for active hands-on learning creates the right conditions for keeping them on-task and productive.

Maryville Middle School in Maryville, Tennessee, is an award-winning school of 1,030 students near Knoxville. Active learning is a way of life at Maryville. Teachers have created a variety of ways to capture and hold student interest. One such project is STARS, which allows students to analyze information and draw conclusions using a project approach to learning.

Subjects taught at Maryville are not markedly different from other middle schools. Students learn math, science, social studies, and other subjects, but they do so differently than in typical schools. Students learn by working in teams to carry out problem-based inquiries. They seek answers to questions that relate directly to their lives: "How do I buy my first car?" "How does HIV affect me?" "How nutritious are school lunches?"

STARS, a problem-solving paradigm, helps students pursue answers to such questions over an entire school year. They begin by identifying the problem to be solved, forming a hypothesis, testing the hypothesis by experimentation, doing library and Internet research to gather information, interviewing people from the local community, analyzing information, and drawing conclusions. Students make extensive use of technology, which includes producing a final report using multimedia software. Students give their final reports at a spring open house attended by their parents and other members of the Maryville community. This combination of conditions provides obvious incentive for students to do their best work and allows parents and friends to show their interest and support.

Because of the interdisciplinary nature of the curriculum, information searches are not confined to one subject. Instead, a student's quest for information focuses on solving a problem, regardless of where it leads the investigator. Teachers work in teams to support and facilitate this work across traditional subject lines. They plan cooperatively and encourage students to make natural connections by seeking answers to real issues such as "Is Year-Round-School a Good Idea?" and "Recycling in Blount County." Teachers meet regularly to monitor and adjust project requirements and timetables. They also consult with students on a regular basis and upon request.

Some very important assumptions about learning are implicit in Maryville's program. Clearly, its creators recognize that student ownership of projects is crucial. Students are expected to take an active role, to learn by doing, and to solve problems within the framework of a team. Individuals make unique contributions that build on their own strengths, and they learn to appreciate the unique strengths of others. Their work is put on display for the public, which has great power in motivating learners and building community support.

Maryville's extensive professional development program focuses on successful use of instructional technology. Teachers learn how technology can be used as a tool for learning and then get the skills they need to assist students. In-house staff members often provide this training, which has included such topics as "Using academic support software to enhance student learning," "Searching the Internet," and "Using an electronic grade book."

Technology Use

As noted above, technology is an important facet of STARS. First, students gather information for their reports from a wide variety of sources, including the Internet. Students carry out their own searches with assistance from the teachers, who act as coaches. In this process, students learn how to narrow a topic, divide responsibility among team members, and gather and summarize information. Students learn to use software for word processing, spreadsheets, databases, desktop publishing, animation, and multimedia authoring. The school also uses a range of computer-based instructional programs.

Second, students develop and present their reports in multimedia format using Superlink, an advanced type of presentation software. Teachers provide direct instruction, and students are encouraged to experiment with various formats. The power of technology enables students to communicate findings clearly and effectively using visual enhancements. Maryville principal Joel Giffin indicates these activities combine behaviorist and constructivist approaches to learning.

Maryville is equipped with more than 300 networked computers, most of which are housed in labs. Students spend at least one 50-minute period every other day in a computer lab; some, especially those described as "lower performing students," spend as much as three or four class periods a day. Technology plays a vital role in Maryville's programs; however, Joel places technology in the proper perspective: "We would individualize instruction even if we didn't have the computers. Technology allows us to do a better job . . . . With technology, every student can be working at [his or her] own level. A teacher in a classroom can't do that."

Funding

Budget information is relatively meaningless for STARS because of the seamless nature of Maryville Middle School's many programs. STARS focuses on project-based learning, but this activity fits so well with the school's general scheme that costs are not easily separated. For example, computers used to implement the project approach may or may not have been purchased with funds received for the STARS program. Nevertheless, it is useful to have some idea of the size and scope of STARS by noting that the Tennessee Department of Education provided a budget of $59,850, distributed as follows: hardware ($40,350), software ($13,500), and teacher training ($6,000). The hardware budget covered the costs of computer terminals, digital cameras, video cameras, and scanners, all of which are also used for projects outside STARS. Software costs include packages for authoring, digitizing, and networking, which allows all students access to the programs throughout the building. The school received grant funding for some of the necessary equipment; additional funding from school fund-raisers and local contributors helps keep it upgraded.

Outcomes

Maryville teachers do not act as disseminators of knowledge, nor do they test outcomes using only simple paper-and-pencil devices. Just the same, this approach has enabled Maryville Middle School students to perform well on the Tennessee Comprehensive Assessment Program (TCAP), which consists of the Terra Nova standardized test and Tennessee Writing Assessment. Maryville is ranked high among Tennessee schools for improvement in student performance on the Tennessee Value Added Assessment System.

Maryville Middle School undoubtedly has used technology to take project-based learning to a new level.

For additional information, contact

Joel M. Giffin, Principal
Maryville Middle School
Maryville City Schools
805 Montvale Station Road
Maryville, TN 37803

Giffinj@ci.maryville.tn.us
Phone: 423-983-2070
Fax: 423-977-9413
URL: http://www.ci.maryville.tn.us/mms

Training on Technology for Students (TOTS II)

As more and more schools improve their computer infrastructures, schools still trying to enter the computer age are in danger of being overlooked. Some schools are forced to face this problem on their own. How does a school lift itself up by its own bootstraps to join the technological age? Hamilton Accelerated Elementary School in Memphis, Tennessee, has illustrated how it can be done. An enormous effort over a long period of time is required, but it can be accomplished with dedication and determination to succeed.

Hamilton technology coordinator Trina Holly is responsible for teaching computer basics to all students. She teaches computer skills to her fellow teachers and provides technical assistance in setting up computers, linking to the Internet, and keeping equipment operational.

These duties are enough to keep Trina busy, but she also has assumed the important role of seeking money to equip Hamilton with computers. She writes and submits proposals to various local, state, and federal agencies to establish the basic infrastructure needed to make computers a part of the learning environment. Her success in finding funds led to the development of the Training on Technology for Students (TOTS) program.

The TOTS program has seen two phases. In phase one, computers were purchased for grades K-2. In phase two, known as TOTS II, the program purchased computers for the third-grade classrooms and provided stipends for a weeklong inservice teacher program on technology. This training was tailored to the skill level of each teacher. For some, the summer workshop served as an introduction to computers; for others, it was more advanced. The teachers were given a description of the workshop and encouraged to make their own decisions about whether they were ready to participate. In the workshop, teachers learned how to use software packages to support classroom learning activities. The software included Netscape, HyperStudio, Microsoft Office (including Word, Excel, and PowerPoint), The Graph Club, The Amazing Writing Machine, and Storybook Weaver Deluxe.

School reform was not the main objective of the training but was a subtle element in the TOTS II program. Computers and software packages were presented in a context of helping teachers *think differently about learning.* School reform has an increased chance of success when it involves a change that adds an element of novelty for children (and teachers, too, for that matter). It is not pejorative to call such a change a “gimmick”—a means of creating interest. At Hamilton, the gimmick has been making the third graders employees of a company called the TOTS II Publishing Company.

In addition to building a technology infrastructure for Hamilton, the TOTS program addresses several goals related to student learning: raising student achievement levels through technology experiences with a special focus on written communication; helping children connect the content of school lessons to future careers; using technology to communicate; and motivating students to share responsibilities, make decisions, and exchange information through collaborative team activities.

Like the programs described earlier in this chapter, TOTS has allowed Hamilton to adopt a project-based approach to learning and use computers to support the curriculum. Projects often involve development and learning activities that transcend traditional curriculum lines. The TOTS II Publishing Company teams are 34 small groups of third graders who work collaboratively to prepare written reports on topics that grow naturally from their ongoing curricula. (This focus on collaboration is a theme at Hamilton and throughout Memphis City Schools.)

Language arts was the initial venue for TOTS II students, but as noted earlier, the writing projects have allowed teachers to bring together various subject areas, such as units on Thanksgiving and the solar system. At first, students completed writing projects on a one-week cycle, but teachers eventually realized this short time period limited opportunities for collaboration. Accordingly, cycles were expanded to two weeks and, eventually, four weeks.

The TOTS II Publishing Company simulates a work environment by involving rules and incentives such as those found in the real work world. For example, as employees, Hamilton third graders are expected to arrive on time, meet deadlines, and work cooperatively with other employees. Students receive “imaginary pay” when tasks are completed according to company deadlines. Meritorious work can be substituted for homework; it can also earn recognition for an employee and/or team of the month/year or bonus pay that can be used to purchase real goods such as tickets to a carnival. Loss of pay occurs when workers are tardy, absent from work, or miss deadlines.

The School and Community

Hamilton, located in an urban setting, enrolls 720 children; 93 percent qualify for free or reduced-price lunches. The school works hard to provide many advantages that children in suburban schools take for granted—modern computers, for example, and teacher access to training in instructional technology.

Technology Use

TOTS II incorporates technology in a number of ways. Children use the Internet extensively to gather information for their reports. They also organize and prepare their written reports using spreadsheets, word processing, and the various presentation software teachers learned about in their summer workshop. Many of the activities in the TOTS II program could be accomplished without computers, but much of the excitement would be missing. Without computers, the number and types of research sources would be greatly curtailed, and the final reports would be less attractive and lack the enhancements publishing software can produce.

Funding

The Tennessee Department of Education funded TOTS II as part of the state's 21st Century Classrooms initiative, designed to help schools set up model technology classrooms. The budget for TOTS II was a onetime grant of $45,500.

Partnerships

Partners that have helped TOTS II include the Bulk Mail Center, located in the local school community, and the Ben F. Jones Chapter of the National Bar Association. They have assisted with an annual fund-raising carnival, and their employees have served as judges in an awards program to select TOTS II "employees of the month" and the "employee of the year."

Outcomes

The success of the TOTS II program is being documented with both formal and informal data, using the Memphis Writing Rubric, checklists, and the results of the state-mandated standardized achievement test (Terra Nova). Additionally, Trina conducts structured observations in the regular classrooms and computer lab and she has interviewed children and teachers to gather feedback about the impact of the program.

Challenges

Trina and her colleagues have encountered several challenges related to implementing a new program, such as creating a new computer infrastructure from the ground up. Other problems have included limited computer availability, delays in gaining Internet access, and finding time to infuse technology into the curricula. Despite these obstacles, TOTS II illustrates how schools can first establish a technology infrastructure, then integrate it into the ongoing curricula.

For more information, contact

Trina M. Holly
Hamilton Accelerated Elementary School
Memphis City Schools
1378 Ethlyn Avenue
Memphis, TN 38106

hollyt@tennash.ten.kl2.tn.us
Phone: 901-775-7826
Fax: 901-775-7827

Chapter 2

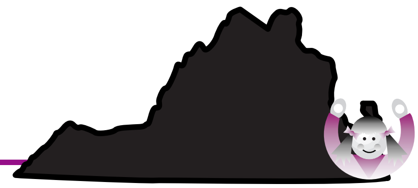
School reforms have various goals, but most share a common objective of improving student learning. Knowledge and use of technology have become hot-button issues with reformers that target teacher competence. It is almost a given that teachers who are not knowledgeable about or comfortable with technology cannot provide students with learning opportunities that optimize the use of technology. Accordingly, school systems in every state are taking steps to assure that teachers become competent in technology use.[1]

Many state legislatures and state education departments recently have imposed a technology competency requirement for teacher certification. Such mandates require college and university teacher preparation programs to demonstrate that new candidates for certification are competent in using technology. These same state mandates also require that experienced teachers who wish to renew their teaching certification demonstrate competence with technology.[2]

In 1996 the Virginia State Board of Education carried out the wishes of the Virginia General Assembly by establishing eight Technology Standards for Virginia Instructional Personnel. The Virginia State Superintendent of Instruction ordered each school division to create programs that guarantee teacher mastery of those competencies.[3] School systems throughout the United States face similar mandates from their state education departments. Several of the programs in this book were chosen because they have responded in an exemplary manner to this widespread movement.

An underlying theme runs throughout these exemplary professional development programs: teachers need both the time and the opportunity to gain competence in instructional technology. Local circumstances usually dictate how, and whether, this challenge will be met. Leaders in each school and each school system must decide how to proceed.

Teacher Technology Competency Project



This program addresses a problem common to most professional development activities throughout the nation. Despite research showing the importance of creating incentives and providing time for training, most teachers must use their personal time to participate.[4] *Educators know the problem from personal experience, but some administrators and school board members do not understand the burden teachers face in upgrading technology skills on their own time. This probably plays more of a role than any other factor in slowing the infusion of technology into classroom instruction. Poquoson has made a legitimate attempt to address the issue.*

Poquoson, located in the Hampton Roads area of Virginia, enacted a three-phase program intended to help school personnel acquire the necessary knowledge and skills to satisfy the eight state technology standards for teachers. Judy McDowell, Director of Instructional Support Systems for Poquoson City Schools, created a teacher professional development program that is available to teachers at no cost. During the 1998-99 and 1999-2000 school years, Poquoson assisted teachers in meeting six standards; the two remaining standards will be addressed in 2000-01. Newly employed personnel are given three years from the date of their employment to meet all eight technology standards. (See Appendix B for standards and portfolio requirements.)

The Teacher Technology Competency Project has involved all 210 K-12 teachers from four different schools. It is offered during the summer and throughout the school year as one-, two-, and three-credit college courses and as short minicourses ranging from 30 to 90 minutes in length. These professional development activities enable teachers to satisfy state requirements governing renewal of teaching certification every five years. While participation in school-sponsored training is free to teachers, they receive no pay for the time they spend in the programs.

The Teacher Technology Competency Project's mentoring approach helps all city teachers prepare a performance-based portfolio that demonstrates mastery of the eight state technology standards. Trainers are Pouqoson school system employees who have demonstrated expertise in a particular technology area. Some work as librarians or media specialists; others are principals, classroom teachers, and supervisors. Some also serve on a division technology committee, which works with Judy McDowell to identify workshop instructors and topics. Participant feedback helps the committee evaluate the training and determine who will teach future sessions.

A major challenge in providing technology professional development here, as elsewhere, is matching the level of instruction to the readiness of teachers to learn the content. For example, instruction on multimedia software is not meaningful to a teacher who is still learning how to do word processing. One solution is to let teachers choose the training sessions that best meet their needs. This self-selection approach has been highly successful in Poquoson. In essence, the state set the standards, the school system provided the training opportunities, and the teachers chose the training that fit.

The following examples illustrate the kinds of training opportunities made available to Poquoson teachers in the 1999-2000 school year.

A local community college offered a series of one-credit courses in the summer. Content was customized to the participants' needs, subject to approval by the committee.

1. **Applications of Technology for Professional Use** (one credit) covered word processing, databases, spreadsheets, desktop and file management, presentation software, peripherals (digital cameras, scanners, LCD projectors), desktop publishing, and copyright and ethics issues.

2. **Applications of the Internet for Educators** (one credit) discussed the structure of the Internet, power searching and bookmarking, educational sites, site evaluation, Web page construction, Web projects, e-mail resources, and copyright and ethics issues.

3. **Curriculum Integration of Technology** (one credit) addressed one-computer classrooms, database and spreadsheet use in the curriculum, Internet use in the curriculum, software evaluation, video and laser disc techniques and resources, and correlations between the curriculum and state education standards.

Within the district, minicourses were offered throughout the school year. Taught by district personnel, topics covered a wide range of skills, from learning software to troubleshooting and maintenance of equipment, from mastering technology vocabulary to operating peripheral equipment. Typically, sections were offered for beginning, intermediate, and advanced students. Specific topics might include Microsoft Word, the new iMac, Web page authoring, using the data projector, troubleshooting the Mac, digital imaging, printer maintenance, and mining the Internet, which offers sections that focus on various content areas.

The nature of the training varies from topic to topic and from level to level, but modeling, demonstrations, and coaching are primary modes of instruction. The main incentive for teachers is the chance to satisfy state recertification requirements. Of course, many teachers participate for intrinsic reasons, such as to pursue an interest in technology or enhance their teaching.

Poquoson teachers also enjoy the advantage of a "Tech Day," a full-day break from normal teaching duties to upgrade their technology competencies.

Funding

Some state legislatures appropriate special funds to improve teacher competence in technology. Often, this money has been designated to improve student achievement in general, and technology is just one part of the effort. West Virginia and Tennessee, for example, have provided such funds. In other states, such as Kentucky, special state appropriations support technology infrastructure but rarely cover the cost of professional development activities. Even when states provide financial support, much of the cost for professional development—for building teacher competence—still falls on local schools and districts.

Obtaining funding for professional development is a major concern for educators. While huge expenditures have targeted infrastructure, relatively little has been spent on preparing teachers to use the technology. This pattern must change if the promise of technology is to be realized.[5]

Poquoson and most other school systems struggle to find money for teacher technology training. Poquoson has pieced together funding from various sources. The total cost of the program is estimated at $39,400. The largest share of the budget ($26,650) is funded by a laptop computer initiative, part of a Technology Literacy Challenge Grant through the Virginia Department of Education. Another portion ($5,200) comes from the local match to the state hardware grant. A Goals 2000 grant provides $550. An additional slice ($6,000) is from state funds intended to train teachers to meet the Virginia Standards of Learning. Finally, $1,000 of the funds are obtained locally. "Piecing together" funds from various external sources is typical, and significant, because Poquoson has invested very little local money. More and more school systems seem to be chasing a limited amount of state and federal dollars. What will happen when grant money dries up or becomes oversubscribed?

Outcomes

It is difficult to evaluate the actual success of any professional development program. Participating in training sessions is one thing; demonstrating competence is quite a different matter. Poquoson addresses this issue by requiring teachers to develop a portfolio in either hard copy or electronic format. The portfolios are evaluated with a rubric that provides specific standards, thus making the process straightforward. For example, Virginia's first technology standard states, "Operate a computer system and utilize software." The Poquoson rubric requires teachers to present three pieces of evidence, such as a disk on which they have saved at least two files. The rubric describes this as proof of use.

In Poquoson, a school-level administrator works occasionally with a committee of peers to decide whether the state standards have been met. Portfolios like those developed by teachers in Poquoson are extremely useful in assessing/evaluating teacher competence with technology, but they do not reveal how technology is actually being applied in the classroom. Judy McDowell believes Poquoson is fortunate to have administrators who know what to look for when observing teachers in the classroom.

Challenges

School systems throughout the country face the same professional development needs that Poquoson City Schools has tackled. When asked about special challenges, Judy McDowell identified one as meeting the needs of teachers of different grade levels. She also indicated that adapting training activities for administrative personnel can be a challenge because their needs are very different from those of classroom teachers. Lack of time is the other major problem Poquoson and other school systems confront. Teachers have enormous difficulty finding the time to participate in training, and even after teachers learn to use technology, little time is available to develop lessons that infuse technology sensibly.

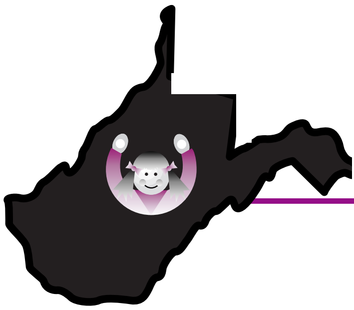
Poquoson's program for professional development demonstrates how one school system has responded to the challenge of helping teachers and other school personnel upgrade their knowledge of technology. While it is surely exemplary, it is not extraordinary or exotic. This solid program builds on the internal strengths of the present staff and takes advantage of disparate funding sources. School leaders everywhere can be encouraged by this example and can aspire to create a similar program.

For more information, contact

Judy McDowell, Director
Instructional Support Services
Poquoson City Schools
500 City Hall Avenue
Poquoson, VA 23662

jmcdowel@sbo.poquoson.k12.va.us
Phone: 757-868-3050
Fax: 757-868-3107

Central West Virginia Technology Upgrade for Educators



The Central West Virginia Technology Upgrade for Educators program illustrates that many teachers want to improve their technology skills. In this case, someone seized the moment and secured funds from an external source, giving teachers an opportunity to learn more about technology. Noteworthy is the fact that the training was offered at a time when teachers would not be forced to juggle their teaching duties to participate.

Another exemplary project with a professional development focus involves all K-12 teachers (as well as other school personnel) from the adjoining counties of Braxton and Gilmer in central West Virginia. The Technology Upgrade for Educators program began with a three-day summer technology academy at Glenville State College in 1999. Brenda Bleigh, a Title I teacher and a Christa McAuliffe Teaching Fellow at Burnsville Elementary School in Burnsville, West Virginia, chose summer for the training because teachers have too many other demands during the school year. The academy was not an isolated effort to help teachers in central West Virginia; it built upon several previous training programs that had introduced basic computer concepts. The prior efforts had been smaller and less well-funded but had created an interest among teachers.

The 68 participants were grouped by grade level (elementary school, middle school, high school). They learned how to review and select software packages, and for elementary teachers, special focus was given to integrating software into reading and writing instruction. Teacher needs shaped the topics addressed. As noted earlier, this is an important, and sometimes overlooked, step in creating professional development activities. Brenda and her colleague Paula Nelson, a faculty member at Glenville State College, invited teachers to offer suggestions and describe their aspirations for the academy. Brenda and Paula developed an instructional program on effective uses of certain software packages (Microsoft Word, Print Shop, PowerPoint, Front Page, Excel) and the Internet (creating Web pages, using listservs, and setting up Hotmail accounts).

Following the summer academy, students enrolled in the teacher preparation program at Glenville State College are paid to provide regular on-site technical support to teachers in the two counties. These students are developing a technology handbook for parents and have made presentations about technology at PTA meetings throughout the school year.

Teachers who participated in the summer academy have been invited to participate in follow-up activities such as a half-day workshop on digital cameras. Schools with two teachers attending this session received a Sony Mavica Digital Camera. An ongoing follow-up activity gives teachers the opportunity to visit the Software Preview Center at Glenville State College and borrow software.

The School and Community

Rural Braxton and Gilmer counties are located in the heart of West Virginia and are characterized by high unemployment. More than two-thirds of students in the area qualify for free or reduced-price lunch. Despite the challenging socioeconomic factors, students are succeeding. In 1998 students in both counties scored higher than the national average on the Stanford Achievement Test and ranked in the top 20 among the state's 55 counties. Both school systems have consistent attendance rates of 93 percent or better.

Funding

The West Virginia Department of Education provided funding through a $73,375 grant from the Education First Innovation Grant Program. The state implemented this competitive grant program in 1997 to create infrastructure and provide staff development related to technology. Teachers received a small stipend for participating and free software for their classrooms. Additionally, local merchants contributed small gifts and door prizes—gestures fundamental to the purpose of the academy. They convey that the local community appreciates the teachers for their good work and for devoting their own time to the training.

The West Virginia High Technology Consortium Foundation's Phase 9 project provides additional funding for instructional technology. Funded by state and federal money (a Technology Innovation Challenge Grant), Phase 9 offers laptop computers for teachers who participate in the weeklong training program. To enroll, teachers must first complete a technology standards course and submit an application as a team of three from their school. Since 1992 the Basic Skills Program (grades 1-6) and the SUCCESS (Student Utilization of Computers in Curriculum for the Enhancement of Scholastic

Skills) program (grades 7-12) have furnished computers; software for reading, math, and writing; and support for technology efforts.

Outcomes

Traditional measures, such as improved scores on standardized tests, can seldom be attributed directly to teacher participation in training programs, discouraging many from trying to evaluate impact at all. The Technology Upgrade for Educators program has not shied away from the challenge. It set a specific objective of increasing technology skills by 25 percent. Gains have been determined by examining the results of pre- and post-academy surveys and expert appraisal of projects completed by the teachers. The program established a number of other measurable objectives: 90 percent of the participants will review software packages for five reading programs; 1,500 hours of technical service will be provided; and a technology handbook will be developed and distributed to all schools, libraries, and parent centers in the two counties. Also, Glenville State College students record the amount of time spent providing technical assistance in the schools. These varied attempts to measure the program's impact are noteworthy. The evidence may not relate directly to gains in student achievement, but it documents that the proposed activities are being carried out. Additionally, information is relevant to the goal of upgrading teacher competence. All professional development programs would do well to address these fundamental concerns.

The teachers in Braxton and Gilmer counties have responded positively to the opportunity. Attendance has been impressive; nearly every teacher in the two counties has participated. This professional development activity produced several gains for local schools:

1. additional technical assistance
2. community support for technology
3. public support for teachers

Challenges

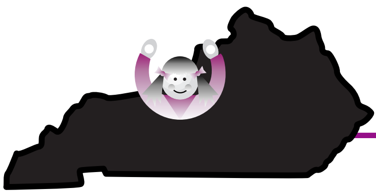
The Central West Virginia Technology Upgrade for Educators program has helped infuse technology into classrooms, but not without confronting a number of challenges. The biggest challenge for the program coordinator has been simply finding the time to make arrangements and provide follow-up training. In addition to her work as a Title I teacher, Brenda voluntarily continues to write grant proposals. This willingness to seek external funding is common to many of the exemplary programs. Most were developed by people who "went the extra mile." Some educators are satisfied doing only the jobs they were hired to do, but individuals like Brenda observe a need and go out of their way to address it.

For more information, contact

Brenda Bleigh
Braxton County Public Schools
Burnsville Elementary School
Box 35, Kanawha Street
Burnsville, WV 26335

bbleigh@access.k12.wv.us
Phone: 304-853-2523
Fax: 304-853-2431
URL: http://www.gsceduc.wvnet.edu/Academy/academy.htm

Empowering Educators: WebQuests and Online Projects



Some readers will recognize this approach as consistent with the increasingly popular teacher-as-researcher movement. In the Whitney Young program, WebQuests and Online Projects are, in a very real sense, examples of action research, allowing teachers to study the success of changes in their teaching practices. It is essential that teachers and other educators document their successes in using instructional technology.

This program at Whitney Young Elementary School in Kentucky's Jefferson County public school system approached the need to provide teacher professional development from an unusual direction. It started when Mary Robertson, the computer teacher and technology coordinator at Whitney Young, was taking a graduate course at the University of Louisville's Technology Leadership Institute. She became acquainted with the WebQuest and Online Project teaching models. WebQuests are inquiry-oriented activities that require learners to use information found on the Internet to complete activities that support thinking at the levels of analysis, synthesis, and evaluation. Since 1995, many teachers have created and contributed new activities to WebQuest sites (such as that of San Diego State University, where they originated; http://edweb.edsu.edu/webquest/overview.htm). Online Projects involve student activities that are designed to enrich lessons or provide interaction with other people via the Internet, through the use of e-mail, e-pals, or chat rooms.

Mary and the school principal Rothel Farris sought financial support from Gheens Academy—a private, local educational foundation—for an activity they called WebQuests and Online Projects. Mary's graduate course experience convinced her that challenging her colleagues to create their own original WebQuests or Online Projects would help them more deeply understand how to integrate the Internet into their classroom teaching. It is important to note that the total cost of this program was $1,000. As we shall see, the amount of money does not determine whether a program will have an impact; it is the power of the idea.

A main program goal was to increase staff self-esteem and confidence while enhancing the academic and technology skills of students. The key ingredients in the WebQuest and Online Projects program were

- training provided by someone knowledgeable in technology
- community spirit
- immediate application in the classroom
- incentives for participation
- public recognition for the accomplishments of the participants
- a supportive environment for trying something new
- readily available technical support

Teachers at Whitney Young already had basic knowledge of computing and access to basic equipment connected to the Internet. The new program offered support and encouraged active use of the Web as a natural part of classroom learning activities.

The program began with a three-hour workshop on incorporating the Internet into instruction. Participation in the training was optional—important because every teacher may not be ready to change his or her approach. The WebQuest and Online Project fostered a "sense of community" by inviting all staff members—including teacher aides, lunchroom workers, and custodians—to participate.

The workshop introduced participants to the value of Web-based lessons through WebQuests, then invited them to submit proposals to fund units of instruction in which students would research or explore Web sites. It was not enough simply to use the Internet. To be funded, proposals had to explain how the planned activity would involve a WebQuest or Online Project.

Everyone who participated in the workshop received a small stipend or inservice credit. To earn additional money or credits, participants designed and completed an activity that satisfied the conditions of a WebQuest or Online Project. To receive their awards, participants were also required to submit documentation that the project had been implemented. This could include lesson plans, objectives, or samples of student work.

Projects included a wide variety of activities ranging from pets to e-pals to a global grocery list. Program participants were expected to document all activities, collect samples of student work, and record personal reflections in an activity journal. A final evaluation addressed such questions as, "If you chose to do this project again, what would you do differently?" and "Did the project help your students understand the concept you were teaching?"

Every teacher, custodian, lunchroom worker, or other staff member who created a project was recognized at a special luncheon on the last day of school in the spring and again the following fall, when the projects were unveiled on the school Web site. The program's successes remain available to be shared with others—http://web2.jefferson.k12.ky.us/Schools/Elementary/Young/wqstaff.html.

The School and Community

Children attending Whitney Young face a number of special challenges. It is an urban school in the west end of downtown Louisville. The 524 students include a high percentage of children who do not speak English as their native tongue. In addition, 81 percent of students qualify for free or reduced-price lunch. Whitney Young employs 32 certified staff members and 45 classified staff, including 18 certified teachers and 20 teacher's assistants who work with K-5 students.

Whitney Young has developed a number of programs to respond to its diverse student population. It is a magnet school in math, science, and technology. It offers ESL (English as a Second Language), early childhood (3-4 year olds), and functionally mentally delayed programs; it also maintains a family resource center.

Technology Use

Technology was important to this program in several ways. Obviously, the WebQuest and Online Projects encouraged students to use the Internet to gather information and make contacts with other people. In addition, technology played a role in recognizing teacher accomplishments and disseminating the specifics of the projects via the Web. This allows other teachers to learn from the work and adds to the growing resources available on the Web.

Whitney Young was the first school in Jefferson County to be "wired." Each classroom has at least two computers (an Apple II connected to an AppleShare network and a Macintosh connected to an ethernet network). Mary Robertson teaches computer classes in the school's two computer labs.

Funding

The school's technology infrastructure was made possible by funds from the Kentucky Education Reform Act of 1990 and a special technology initiative known as Kentucky Education Technology Systems, a $553 million initiative to provide networked computers and other electronic tools to support teaching and learning in Kentucky public schools. The only project-specific funding was a Vision 2000 Innovative Grant for $1,000 from the Gheens Academy of Jefferson County Public Schools. Jefferson County schools were invited to submit proposals for innovative projects in three categories: leadership, knowledge work, and professional development. These areas correspond to priorities established by the Jefferson County

Public Schools. Primary costs were for stipends and staff recognition ceremonies.

Challenges

All school change programs encounter difficulties during implementation and school leaders need to be prepared to spend extra time to plan, organize, and implement new initiatives. At Whitney Young, time was needed to get the projects ready and implemented into the curriculum as well as to create the Web site.

Obtaining funding to support innovation is another challenge. Most school districts do not have a philanthropic organization like the Gheens Academy. Without such a source of support for innovation, even small amounts of money can be difficult to find. Busy school folks are often forced to neglect other obligations, perhaps their own families, to meet the expectations of a demanding public. Yes, the public wants technology in every classroom and, yes, the public wants children to achieve at high levels, but many people feel that "throwing money at the problem" is not the answer. The high cost of technology sometimes makes this bad situation even worse.

One interesting footnote to this story is that Mary Robertson's involvement in the Technology Leadership Institute has—through the WebQuest and Online Projects—led two other members of the Whitney Young teaching staff to enroll in the program.

The WebQuest and Online Projects is truly an inspirational story. For a very small amount of money, Mary Robertson and her colleagues have demonstrated how teachers can move technology to the next level. Imagine what they could do with generous financial support!

For more information, contact

Mary Robertson, Technology Coordinator
Whitney Young Elementary School
Jefferson County Public Schools
3526 W. Muhammad Ali Boulevard
Louisville, KY 40212

mrobert1@jefferson.k12.ky.us
wyoungelem@aol.com
Phone: 502-485-8354
Fax: 502-485-8880
URL: http://www.jefferson.k12.ky.us/Schools/Elementary/Young/wqstaff.html

Tech TEAMS
(Technology Teaching Educational Alternatives for Mainstream Students)

Each exemplary program is complex in its own way. More than the usual amount of care is needed to describe all the important elements of a unique program in north central Florida. This program used three research-based change models—Apple Classrooms of Tomorrow/Apple Staff Development, Creating Independence through Student Owned Strategies (CRISS), and Multiple Intelligences—to help teachers become innovative users of technology and help students become responsible for their own learning.

Like an onion, each element of Tech TEAMS enfolds other layers and adds to the whole. The core of the program is professional development for classroom teachers.

As the name implies, technology occupies a central position in Tech TEAMS. The starting point is helping teachers become competent in technology use. This alone makes it a professional development program, but Tech TEAMS goes well beyond technology. The second phase encourages teachers to reform their classroom practices, using various approaches such as cooperative and project-based learning. Additional elements include restructuring the school day to enhance learning opportunities for special needs children. This draws heavily upon best practices for inclusion as well as team building and leadership development. In the third phase, these latter elements are implemented in demonstration sites at various schools, which allows other teachers to see how the various components of the total program come together to benefit all learners, especially children with special needs. This onion, indeed, has many layers; the peeling process reveals some ideas that have the power to change the nature of schooling and the way computers support learning.

Stated succinctly, the goals for Tech TEAMS are to maximize instructional successes for students with special needs, integrate technology into instruction, establish demonstration sites so teachers can see innovation in action, restructure the school day to improve learning, and create conditions where teachers work as members of collaborative teams.

The Tech TEAMS program was launched in the summer of 1997; each of the 12 participating school systems sent a team of educators to a three-day training session devoted to acquiring basic technology competencies. Teams included teachers (both regular classroom teachers for grades three, four, and five and teachers of exceptional learners), administrators, and technology specialists. Follow-up sessions have occurred at various times during the school year, including Saturdays and evenings. Teachers receive a special stipend for participating in both the summer sessions and those school-year sessions that occur outside normal school hours.

TEAMS uses a research-based staff development model created by Apple. The ACOT (Apple Classroom of Tomorrow) model suggests that teachers advance through five predictable stages in learning to use technology for instruction: (1) entry, (2) adoption, (3) adaptation, (4) appropriation, and (5) innovation. The model addresses more than simply acquiring technical knowledge. Teachers confront their "deeply held beliefs about schooling" to use technology more wisely. An article about the ACOT model captures the gist of this change: "The direction of the [teacher's change] was toward child-centered rather than curriculum-centered instruction; toward collaborative tasks rather than individual tasks; toward active rather than passive learning."[6]

At the entry and adoption levels, teachers bring technology into the classroom but struggle to integrate it into instruction. Often the technology merely supports traditional teaching practices. TEAMS helps teachers at these stages gradually become more comfortable with the technology. As team members complete the first year of the program, they begin to incorporate technology more effectively into traditional learning environments. As teachers become accustomed to the technology, the emphasis shifts to making the learning environment more student centered. In this phase, teachers transform content-related goals into problems for students to investigate. Hands-on activities give students an active role in learning, and curriculum units integrate content across subject areas. The training program shows teachers how to help students use technology to conduct their inquiries and provides best practices for including children with special needs in the learning activities.

In developing curriculum units, team members link the content of Florida's Sunshine State Curriculum Standards to student activities. For example, the state fourth-grade science standards address the subject of weather, so the teacher might pose a question such as *How do we know when a hurricane is headed in our direction?* Questions are designed to intrigue students and invite their active participation. This approach encourages students to make connections between topics of study and their own interests and experiences. Problems of this sort put students in the position of doing the work of an expert, in this case, a meteorologist. The students are given a set of circumstances (e.g., facts about weather conditions, including temperature, location of the jet stream, barometric pressure trends) and challenged to make decisions to protect the public. This requires students to seek information from available resources such as the Internet, to understand the situation, and plan an appropriate course of action. Students ask themselves questions such as *Does the information indicate a hurricane is imminent? What other information do we need? Where can we get this information? What instructions should be given to citizens about evacuating coastal areas?*

Students are often organized into teams, and children with special needs take their places alongside others and contribute equally. This is a deliberate attempt to restructure the school day to improve learning, especially for children with special needs.

In the latter stages of TEAMS, the training shifts from making changes in classrooms to encouraging teachers who have excelled to become leaders. Participants are expected to train others in implementing technology and restructuring the learning environment. The immediate goal is to give those in the leadership program the necessary tools and knowledge to foster change throughout the school. The ultimate goal is to plan and implement changes that have promise for achieving schoolwide systemic reform. The third phase of the program also devotes special attention to helping principals serve as change agents for their schools. During this phase, principals create an action plan that includes comprehensive staff development designed to broaden reform efforts for the entire school. Restructuring focuses on scheduling arrangements that support inclusion and implementation of a variety of teaching strategies, including effective use of technology.

The School and Community

Headquartered in Lake City, the program is a consortium of 12 rural school districts and 3 cooperating universities. Most of the schools are Title I and have 50 to 85 percent of children eligible for free or reduced-price lunches.

Technology Use

Technology is essential to the Tech TEAMS project. The ACOT model is basic to the way teachers are trained, and a primary goal of the program is to involve students in using technology as a tool for learning.

Funding

Goals 2000 funds support the program in the form of a $440,000 professional development grant from the Florida Department of Education.

Outcomes

A number of outcomes demonstrate the success of this program. Model technology classrooms at each target school and district have demonstrated effective practices for integrating technology into teaching and learning. The leadership program has developed a cadre of teachers to mentor others through the evolution of thought and practice in technology integration. A number of factors will help schools evaluate the positive impact on students, such as students becoming more responsible for their own learning and more willing to work collaboratively to solve problems, think critically, and develop products. All students, including those with special needs, should become adept at using technology as a learning tool, become more confident, and develop a deep understanding of content.

Challenges

Any program as ambitious as Tech TEAMS encounters a host of challenges. The sheer size and scope of the program guarantee that coordinating and communicating require constant attention. Another hurdle is gaining administrative support for the program across so many different school systems. Even though training coordinators try to avoid conflicts with other events, teachers occasionally have trouble juggling their busy schedules, Tech TEAMS activities, and local school activities. For example, it is nearly inevitable that an evening training session will conflict with at least one local PTO meeting or parent conference.

Another problem is losing team members who had become valuable contributors to the program. Transfers, retirements, maternity leaves, and such intrude on the stability of a long-term program like Tech TEAMS. A school is no different than business and industry in the sense that training investments do not always provide a full return due to personal and health considerations. This loss of expertise is even more pronounced when team building is a major goal.

Earlier, I likened Tech TEAMS to an onion having many layers. A more suitable metaphor might be a rose's many petals unfolding to reveal an intricate and attractive flower.

Actual units of study developed as a part of this project can be found at the URL listed below.

For more information, contact

Robin M. Hurst
ECE Program Coordinator
Columbia County Schools
Route 7, Box 541
Lake City, FL 32055-5495

rhurst@atlantic.net
Phone: 904-755-8049
Fax: 904-758-4880

Christine Bond, Director
Student Support Services & ESE
532 West Duval Street
Lake City, FL 32055-5495

mailto:chris-bond@usa.net
Phone: 904-755-8053
Fax: 904-759-4880

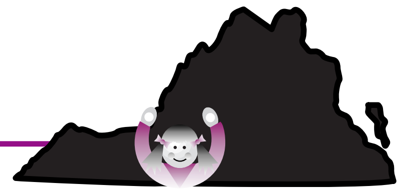
Lynn Blanton, Apple Staff Development Trainer
lynblanton@earthlink.net
URL: http://www.atlantic.net/~ccsb/INCLUSION/

Chapter 3

While each of the exemplary programs described in this book is unique, some share striking similarities and have common goals. For example, several programs were designed to make projects the main vehicle for student learning, while others were designed to provide professional development for teachers in the area of technology. The Center for Applied Technology and Career Exploration (CATCE) in Rocky Mount, Virginia, is so unique it cannot be grouped with other programs under a common heading. The Florida High School and Computing Senior/Computing Parents also stand by themselves. These three are categorized as programs that promote broad-based systemic change.

Programs such as CATCE and The Florida High School operate on a different scale and with a different life expectancy than the other programs selected for this book. One Heart, WebQuests and Online Projects, and most of the other programs should be relatively easy to adapt. But it would be a major challenge to replicate the CATCE or The Florida High School programs, which require extensive planning, massive curriculum changes, and substantial funding.

Center for Applied Technology and Career Exploration (CATCE)



Many of the activities at CATCE could continue without technology. Problem-based learning is not dependent on computers, nor is exploring careers. The effectiveness of these and other curricular innovations, however, is enhanced considerably by the opportunity students have to access, analyze, manipulate, and present information using technology. More importantly, CATCE's learning activities were planned from the outset with full knowledge that a technology-rich learning environment would be available to enhance learning. In their planning, teachers have always been encouraged to anticipate the availability of extensive technology.

CATCE is both a place and a program. CATCE, *the building,* is an open-space structure that provides a unique educational experience for all eighth graders in rural Franklin County, Virginia. CATCE, *the program,* is an approach to learning that changes the role of the teacher as well as the role of the learner.

CATCE may be unique, but it does include elements common to the other programs. For example, it is committed to an integrated curriculum and makes use of problem-based learning, hands-on learning, and standards-based curricula. Despite these similarities, a number of substantial differences place CATCE in a separate category. Whereas most of the projects have a limited life, CATCE is expected to be a permanent part of the educational environment in Franklin County. And while most of the programs have two or three main goals, CATCE embraces broad objectives that affect all students.

What sets CATCE apart is that it represents a total systemic reform of schooling as we know it. CATCE exists because leaders dreamed of a new way to approach educating all eighth graders in a school system. They believed the changes implemented at CATCE would ripple throughout the school system to influence what happened in other grades and at other buildings. The CATCE model includes a low teacher/pupil ratio (1:15), and all eighth-grade special education students participate fully in all modules. A formative evaluation during the first year of operation called CATCE "an engine for school reform in Franklin County."[1]

CATCE's name features two of its primary components: *applied technology* and *career exploration*. The instructional program connects content to work situations, making such nontraditional subjects as manufacturing and legal science topics of study. Generous use of technology supports the learning environment. For example, students who study finance take advantage of the capabilities of computers to generate spreadsheets, ledgers, charts, and graphs.

School Superintendent Leonard Gereau, along with staff in Franklin County, articulated the vision that guides CATCE and helped persuade local taxpayers to pass a bond issue to upgrade learning at all levels. This vision extended to constructing a modern facility that makes pervasive use of technology. To address the goal of career exploration, the building was designed to resemble the headquarters of a business corporation.

The school board appointed Dr. Paul Jay Strickler to coordinate the curriculum design for CATCE and work with the architects on space and design issues. Over a two-year period, a steering committee and various stakeholders—including local business leaders, parents, government officials, and volunteer teachers—developed a curriculum emphasizing active, hands-on learning experiences for children.

The school system sought teachers who could turn the CATCE concept into reality. A teaching staff was selected carefully from the ranks of seasoned local teachers and from the worlds of business, communications, and art. Master teachers were paired with experts and professionals—engineers, news anchors, artists—to implement the new curriculum. The faculty worked with consultants to understand different approaches to learning, such as problem-based learning and the Socratic method of dialogue. Teachers received extra pay for participating in the training, but much of the work was done on a voluntary after-school basis.

CATCE's instructional modules are devoted to real-world activities such as manufacturing, engineering/architectural design, and mass media. In keeping with the career exploration theme, students are called "interns." They spend half the eighth-grade year—one semester—at CATCE and the other half at Benjamin Franklin Middle School. During their semester at CATCE, students choose three modules. Each lasts six weeks and immerses them in a single career area. CATCE modules include the following areas:

- environmental/natural sciences
- finance

- manufacturing
- engineering/architectural design
- health and human services
- media design
- legal science
- arts

Curriculum units cross traditional subject lines and emphasize applying information to solve real problems. For example, students in the engineering module have studied the best route for an interstate highway expected to pass through Franklin County. In other instances, students in the media design module have used video equipment and Avid Cinema to prepare 30-second commercials promoting products of their choice.

Manufacturing students have simulated the rebuilding of a fire-ravaged production facility that produced in-line skates. Using a computer-simulated production line, they also explored turning raw materials into final products and experimented with alternate approaches to manufacturing. Such activities teach about the interrelationship among cost, quality, and other key elements of economics.

In another learning activity, environmental science students took biological measurements to determine the health of the Pigg River, which has its headwaters in Franklin County. Students sampled invertebrate species, tested the water for harmful chemicals, prepared reports, and presented their findings in a form suitable for a scientific symposium.

A regular activity in the manufacturing module has students search the Internet to learn about a publicly held company or corporation. They then prepare PowerPoint presentations and brochures about the company's products, production, and management. Students also track the company's stocks on the Internet over an extended period and create spreadsheets and graphs documenting the changes.

Students in the legal science module apply what they learn about the justice system by conducting mock trials. Students role-play the parts of the accused suspect, judge, prosecuting attorney, defense attorney, witnesses, police officers, and jury. Local attorneys observe the trial and offer comments and clarification about points of law.

Students in the environmental science module plant wooded buffers along streams to stabilize banks and improve stream health. They study the benefits for wildlife and learn how to establish these buffers using various species of trees. The students explore the benefits of best management practices for farmers and work with local conservationists to create conservation sites on local farms.

In a popular ongoing activity, student teams research an endangered species native to Virginia and develop a public information campaign. This might include creating a Web site, designing greeting cards that feature the species, writing a book for children, designing a T-shirt with a slogan, and preparing and presenting a report using PowerPoint.

Students in the health and human services module regularly develop multimedia presentations on health concerns of interest to young people, such as substance abuse and eating disorders. Students also use problem-based learning to sort through the aftermath of a disaster scenario, deciding how to care for the injured and restore public services.

The arts module provides opportunities for students to explore electronic music, digital imaging, and three-dimensional modeling. Students combine these skills to produce clay animation movies.

The Facilities

Flexibility is a main feature of the modern CATCE building; learning spaces contain carpeting and movable walls, and modules are equipped with movable furniture. Students circulate freely in the modules, often collaborating on team projects by gathering around computers, sitting around tables, and meeting in small conference rooms. An open-space structure with an atrium and a common area supports team-based learning. Teachers have offices and work spaces similar to those found in a corporate setting. The abundance of technology is a striking physical aspect of CATCE. Computers, in particular, dominate the space, with one available for every two students. Each module requires its own special equipment, although scanners, printers, digital cameras, VCRs, and LCD projectors and laser disk players are available in every module. A fitness lab adjoining the health and human services module offers a treadmill, stationery bike, rowing machine, ab builder, and biofeedback workstation. A greenhouse adjoins the environmental/natural resources module. The communications module features a well-equipped television production studio, including a sound mixer and editing board. The manufacturing module maintains a robotic arm, pneumatics simulator, quality assurance/precision measurement equipment, and a basic electricity lab and miniature manufacturing production line. CATCE teachers also have access to additional sophisticated equipment, such as electronic white boards, camcorders, and a building-wide media management system.

Funding

Experienced educators will recognize that very few school systems can afford to equip a school so generously. Franklin County voters approved a

$14.6 million bond issue by a 20 percent margin. This accomplishment is significant in any place, but especially in a rural southwestern Virginia county that lacks a broad economic base and has a history of high unemployment. In addition, school leaders sought external support to supplement the bond issue. The U.S. Department of Education's Technology Innovation Challenge Grant program provided $1.4 million, part of which supported curriculum development. Franklin County was one of only eight rural districts to receive such a grant in 1996.

In what seems to be a pattern repeated in successful programs across the United States, one innovative idea in Franklin County led to another, and innovation tends to attract financial support. While the CATCE concept was being created, the school system prepared additional funding proposals to support certain aspects of the county's total technology program. In 1998, the county received a $225,000 grant through the Telecommunications and Information Infrastructure Assistance Program (TIIAP) sponsored by the U.S. Department of Commerce. TIIAP has several goals, ranging from increasing basic literacy to incorporating applied technology. Franklin County used this money to provide computers for various community sites (schools and libraries) to increase basic literacy of adults who lacked high school diplomas. Technology has played a prominent role in the program, and the momentum created by CATCE and the county's commitment to technology undoubtedly was essential in gaining this grant for the school system. In the same vein, $17,000 from the Virginia Economic Bridge Initiative in 1998 helped equip CATCE's Interactive Lab for distance-learning activities; the lab also is available to the local community. Finally, a grant of more than $50,000 from the Virginia Technology Literacy Challenge Fund in 1997 supported teacher professional development.

Outcomes

One of the most noteworthy features of CATCE is that so many things have come together at one time and in one place: curriculum development, state-of-the-art hardware and software, a new building designed to support the infusion of technology into learning, parent involvement, and the involvement of business and industry leadership. This is extraordinary. In most schools, educators are forced to make changes incrementally; restrictions of one kind or another typically limit the amount of real change that can occur. A new piece of hardware can be purchased or a few professional development activities can be offered, but educators are seldom able to combine these and other essential ingredients into a total package. A school may have a long-range plan for all these elements, but CATCE brought many components together from the beginning. Educators everywhere will be watching CATCE with interest over the next few years to see whether this unique experiment in learning works as expected.

For more information, contact

Marcie H. Altice
Franklin County Public Schools
25 Bernard Road
Rocky Mount, VA 24151

maltice@frco.k12.va.us
Phone: 540-483-5289
Fax: 540-483-8744
URL: http://www.frco.k12.va.us/CATCE/catcemain.html

The Florida High School (FHS)

Not everyone is sanguine about the idea of on-line learning, but, in contrast to many simplistic and mechanistic distance-learning programs, FHS represents a thoughtful and well-organized effort that will help educators everywhere understand the ultimate value of such programs.

The Florida High School (FHS) lives by the motto “any time, any place, any path, any pace” because it is open 24 hours a day, seven days a week, offering courses on-line. Students who live in any Florida school district affiliated with FHS are eligible to enroll. The original vision was for students to be able to complete all the requirements for and receive a diploma from FHS. Administrators have made substantial progress in that direction and expect to offer a complete high school curriculum on-line by 2001.

FHS was designed to meet the following goals:

- provide an educational choice for citizens
- enrich offerings in various subject areas
- improve academic achievement through acceleration and retaking of courses
- offer education on a “never closed” basis
- prepare independent learners

FHS had its origins in Orange County Public Schools’ Web School program in 1996. Orange County initially offered five courses via the Internet. The Florida Department of Education took notice and offered a $200,000 Break the Mold Grant to expand the Web School concept. Educators from Orange and Alachua Counties collaborated for six months and launched The Florida High School. FHS began with 11 on-line courses in spring 1998. Financial support from the Florida legislature has expanded FHS to its present size: 55 staff members, including 33 instructors, offer 51 courses to about 2,000 students. The FHS student population is 51.5 percent male and 48.5 percent female. The racial breakdown is 4.4 percent Asian, 5.2 percent African American, 5.3 percent Hispanic, 0.5 percent Native American, 1.6 percent multiracial, and 83 percent White.

Students are distributed by grade level as follows:

Grade 7: 1.0%
Grade 8: 7.8%
Grade 9: 21.2%
Grade 10: 23.7%
Grade 11: 24.6%
Grade 12: 21.8%

FHS serves a variety of groups, including students who live in rural locations, work full-time, have special medical conditions, or are physically disabled. FHS also offers courses that supplement the curricula for home-schooled students. This often involves advanced courses, particularly in science and physics.

Students who want to enroll in FHS courses start by going to the Web site (http://www.fhs.net), where they find a menu of selections. Students can learn about the history of FHS, check current course offerings, view a calendar of events, locate staff e-mail addresses and Web pages, and investigate many other topics related to FHS. Clear step-by-step instructions assist students with registration.

The FHS home page contains an enormous amount of information; it also cautions that on-line learning is not for everyone. Before enrolling, potential FHS students must complete an electronic self-assessment questionnaire that addresses the overall question, “Is On-line Learning for Me?” This survey probes a student’s willingness and ability to work independently, work through difficulties, meet deadlines, and communicate in writing, to name a few areas. The questionnaire asks specifically whether the student has access to a computer, e-mail, and an Internet connection (some affiliated schools offer computer labs for students who do not have a computer at home).

After enrolling, students can register for a course by completing an on-line form. If accepted, students, their parents, and their high school counselors sign and submit an acceptable use policy, a counselor verification form, and a parental permission form. If the student is home schooled, the parent is considered the counselor.

After registering, the appropriate FHS teacher contacts the student by telephone to build rapport, gather information about the student’s other commitments, and discuss his or her reasons for enrolling. Based on these factors, the teacher and student reach an agreement concerning an appropriate pace for the course. The teacher provides details about the course, including explicit expectations about the number of assignments to be submitted weekly. These and other steps taken in the 1999-2000 school year reduced the dropout rate from 50 percent—a common figure for distance-learning programs as a whole—to less than 20 percent. This suggests the new procedures are having the desired effect.

Despite these gains, students still drop out. Some may drop a course because their personal schedules do not allow the necessary time, or other school demands may be too great. Sometimes, students no longer have access to the necessary technology, and of course, some find that on-line learning is not for them.

Conversely, FHS occasionally drops students. A teacher may initiate drop procedures if a student is not producing work at an acceptable pace. When this occurs, FHS notifies all adults associated with the student, including parents and guidance counselors. Because a waiting list exists for all classes, FHS administrators take the position that a student who is not submitting work is preventing other students from enrolling. And experience has taught FHS personnel that students who are not accustomed to working independently may fall behind to such a point they cannot recover if left to their own devices.

Independent learning is an important feature of FHS. In contrast to the usual school setting, students infrequently meet face-to-face with teachers and other students. Teachers create course structures that emphasize the independent pursuit of knowledge and also address Florida's Sunshine State Standards. Lessons typically require students to study materials the teacher has selected, perform experiments related to course content, and prepare some type of product such as a written response. Learning activities sometimes offer choices to students in completing assignments. Teachers often link these activities to real-world problems in the form of mock events. Students may be asked to interview someone about a topic or gather relevant information. For example, FHS science teacher Betty Vail has had students arrange interviews with an accident investigator from a local police or sheriff's department to answer the following questions:

- How do you know how fast a car was going? Do you measure skid marks? Do you perform calculations, and/or do you use tables and charts to decipher the data? What percentage of investigated accidents involves speeding?
- How does the radar speed-detection equipment work? How much error is acceptable? How do you calibrate the equipment?

- What is your department's policy regarding high-speed chases? Have you ever been involved in a chase?[2]

Searching the Internet is a common activity in most FHS courses. The FHS home page maintains a collection of materials teachers have assembled for easy access and links to related resources. Additionally, some courses require students to participate in threaded discussions with other students.

Potential FHS instructors are screened carefully to find those who demonstrate an interest and ability to work within an on-line instructional environment. Some FHS teachers are "on loan" from affiliated school systems (Florida law allows teachers to be on loan for two years). In 1999-2000 the on-loan teaching staff represented 15 of the 67 Florida districts; the goal is to represent all affiliated districts.

Just as some learners are not suited to on-line learning, FHS has found that neither are some teachers. A teacher who excels in a traditional classroom may not adapt well to the special demands of FHS. FHS Research/ Resource Specialist Phyllis Lentz says the challenge is to find teachers committed to "providing distance learning experiences without creating a feeling of distance." To help make this adjustment, FHS staff provides extensive professional development to new teachers. This training draws heavily on the knowledge and experiences of teachers who already have made the transition to on-line instruction. FHS principal Julie Young summarizes the underlying philosophy of this training: "FHS is a student-centered model of education that uses technology as a means to its end. It is more 'high-touch' than 'high-tech.' Teaching strategies to ensure student success include vertical teaming, consistent use of high-level critical thinking skills, project-based assessments and online collaboration. Students cannot complete one of our courses sitting in front of a computer; they are required to take 'field trips' into their communities and use a wide array of resources to complete assignments. No student goes beyond 72 hours without teacher contact."[3]

Julie's description of FHS biology teacher Mary Mitchell captures the spirit of FHS learning activities.

Mary's online, project-based curriculum engages students in numerous experiential, collaborative learning activities. For example, in the Create-A-Teen activity the students pretend to be gene researchers (geneticists) and work with another classmate to create a new teenager. In the immunizations activity the students work in pairs to collect information about their own immunizations and conduct research about immunizations. In another project, students in teams visit a Web site depicting a typical home environment and hunt for virtual fungi. These activities present real-world experiences of collaborating to solve problems with colleagues at a distance. All

FHS courses engage students in real-world applications. Each course begins with a real-world motif or metaphoric construct, which places students in a specific role within the course theme. For example, the motif of Mary's course is BioScope Adventures. Students learn Biology by traveling through Cellular City, Gene Jungle, Classification Station, Nano World, Fungus Farm, Bio World Arboretum, and Animal Safari. In each of these adventures, students learn biological science through real-life applications.[4]

Other FHS teachers apply similar active learning in their courses. For example, history teacher Julia Carpenter provides the following instructions for creating a model of a Civil War battlefield:

> You will build a three-dimensional, scale model of your battlefield using any materials you choose. You may choose to use plastic toy soldiers colored blue and gray, for example, to represent soldiers. Sand, twigs, construction paper, pipe cleaners, mirrors, and other items can be used to represent the terrain. Construct your model inside a shoe box or storage box. The model must be built with the following details:
>
> (1) The terrain/geographical features of the battlefield (trees, ridges, mountains, open areas, rivers, railroads, towns, etc.)
> (2) Troop placements for one day/time during the battle
> (3) Artillery placements and fortification positions for both sides
> (4) Direction legend (north, south, east, and west)
>
> You will submit your project by taking a minimum of two photographs of the model (do not mail the model). In addition to the photographs, provide a written description of how your model represents the terrain, troop placement, and artillery placement for the battle.
>
> For example: My model of _______________ battlefield uses twigs and grass to represent fields because most of the fighting took place in open meadows. I used a mirror surrounded by sand to represent the Ohio River.
>
> Your written description MUST include a bibliography of sources. (Make sure your sources are recorded in proper bibliographic format).[5]

Technology Use

Obviously, since FHS delivers learning experiences via the Internet, it could not succeed without technology. With the exception of periodic telephone conversations between student and teacher and some exchanges involving hard copy, FHS is basically an electronic environment. Information is made available on-line, most communication between student and teacher is achieved on-line, and assignments and student responses are submitted on-line. Teachers have developed courses and learning activities to function in an on-line format and structured assignments to maximize technology. To some extent, the nature of the technology shapes the learning activities because of the "always open" nature of FHS. More than any other program in this book, FHS is linked inherently with technology.

Funding

FHS obtains annual funding from several sources. The state of Florida contributes about $4 million annually ($4.3 million in 1998-1999 and $3.8 million in 1999-2000). Orange and Alachua Counties contribute about $500,000 annually ($473,500 in 1997-98 and $560,818 in 1998-99), and companies such as IBM (software and in-kind contributions of $250,000 in 1997-1998) also support the program.

In addition to these major sources, small grants from the state support the development of specific courses. State grants helped Florida State University professors Glen Thomas and Bob Rider develop on-line Latin and personal fitness courses. Several other FHS teachers have received grants to purchase materials for their courses.

Outcomes

The success of FHS can be examined in various ways. The most obvious measure is the number of students who pass their courses and receive credit. In 1999-2000, 2,300 students earned credit through FHS, a substantial increase from the original 200 students in January 1998 and the approximately 2,000 students enrolled in 1998-99. Growth of this kind is a good indicator of success in any enterprise. In 1999-2000 demand for enrollment exceeded capabilities, and registration was closed because of full classes.

Evaluating success through grades provides more than a simple head count; it measures the quality of learning. In 1998-99, 59 percent of the students earned As and 24 percent received Bs. Purists who expect high and low grades to balance out may worry about the skewed nature of this distribution, but remember that the FHS learning model is based on mastery. The premise is that all students can learn the content. The only real variation from learner to learner is the length of time needed to achieve mastery. When mastery is the goal, low grades and high grades need not balance; the only sorting is between those who reach criterion and those who do not.

Advanced placement figures offer another indicator of FHS success. In 1998-99, two of the seven participating seniors from one of the affiliated high schools completed and passed three FHS advanced placement courses. During that same year, 72 percent of FHS students who took advanced placement tests earned passing scores. In computer programming, 62 percent earned the highest possible score on advanced placement exams, and two of the students enrolled at FHS won statewide programming contests.

Another measure of success is the number of school systems affiliated with FHS. All but 2 of the 67 Florida school districts have affiliation agreements with FHS. In addition, 3 charter and 25 private schools have signed affiliation agreements. Phyllis Lentz observes, "The number of affiliation agreements from charter and private schools increases on an almost daily basis."

Researchers are studying the cost effectiveness of FHS. Policymakers who want to use a simple input-output model may believe that on-line instruction is cheaper than traditional classrooms, but this view fails to recognize the many hidden costs, such as those that fund course development and course improvement. Moreover, many benefits of on-line instruction are obscured in an analysis that uses a simple cost-effectiveness framework. For example, it is difficult to place a value on assisting a disabled student who otherwise would not be able to take a course, helping a teenage mother complete courses toward her high school diploma, or allowing a college-bound student to take an advanced math course unavailable in his or her home school. Cost-effectiveness studies that focus on dollars probably will not capture these data.

FHS has been recognized for its basic concept and for implementing an on-line high school successfully. An award from the United States Distance Learning Association (USDLA) acknowledges FHS for designing and delivering an outstanding distance-learning program. FHS Principal Julie Young received another USDLA award for "Most Outstanding Achievement by an Individual." Additionally, science teacher Mary Mitchell—among only eight educators chosen from Florida—received the prestigious Milken Educator Award.

Challenges

While FHS has achieved some financial stability, staff members cite funding as an ongoing challenge. Other challenges include adjusting to continual changes in hardware and software, making the computer systems as supportive for teachers as possible, responding to the constant need for training that keeps teachers up-to-date, and having enough time to manage the many aspects of this dynamic and growing enterprise. Time constraints are especially challenging for personnel because FHS is never closed.

Developing and offering a wide array of on-line high school courses in only a few short years is truly impressive. Educators in many states have talked about making such a program available, but few have succeeded in going on-line with anything that approaches FHS.

For more information, contact

Phyllis Lentz
The Florida High School
Orange County Public Schools
445 West Amelia Street
Orlando, FL 32801

Lentzp@fhs.net
Phone: 407-317-3326, ext. 2781
Fax: 407-317-3367
URL: http://fhs.net

Sharon Johnston
Johnstons@fhs.net
Phone: 407-317-3326, ext. 2361

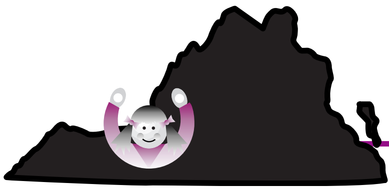
Lifelong Learning as a Route to Community Support for Education

A short digression seems in order before getting into the specifics of the next program. Analysts often cite *A Nation at Risk*, the report of the National Commission on Excellence in Education, as a milestone in expressing discontent with public schools. At the time of the report, the national economy was in turmoil and global competition had escalated sharply. In times of national crisis, public schools almost always come under special scrutiny.[6]

A Nation at Risk proclaimed that a "rising tide of mediocrity" threatened to engulf public schools. Critics raised various counterarguments, but many policymakers agreed with the report's findings and began an attack on public schools that continues to this day.[7] Ironically, this criticism has contributed to increased spending on public education because expanded expectations for public schools has created a need for even greater financial support.

Technology is a classic case of rising expectations for schools. Infusing technology into instruction is expensive due to the costs of setting up the infrastructure, training personnel to use the technology, and purchasing software and other resources to implement new approaches to instruction. Before long, the technology becomes obsolete, and replacement costs are incurred.

Where should the financial support come from? Debates about taxes are common today; political careers rise and fall as candidates attempt to gain favor with voters by advocating or opposing tax cuts, regardless of the consequences for schools. The population as a whole, but especially senior citizens, might be forgiven for thinking that their tax dollars ought *not* be spent on schools perceived to be failing. A program launched in Roanoke, Virginia, addresses these concerns.



Computing Seniors/ Computing Parents

Technology plays a role in all the programs chosen for Patterns of Promise. The element central to all, however, is learning. Some of the programs focus on children's learning while others involve teacher learning. This program is different from the others in the sense that it focuses on a somewhat unexpected group of learners—senior citizens. Educators everywhere can learn from this program. The conditions that have allowed it to flourish are not so very difficult to create, and the payoff can be enormous.

Roanoke City Public Schools offers a unique program that helps senior citizens and parents learn about computers. This program does more than provide learning opportunities, it makes a conscious attempt to address an important challenge confronted by all public schools: gaining and solidifying public support. Many senior citizens do not have a personal connection to schools, so gaining their support can be particularly challenging. Although some older residents have grandchildren who attend public schools, this is not the same as sending children in the immediate household off to school every day.

Many senior citizens live on fixed incomes and are concerned about the cost of public schooling. So it is understandable that senior citizens, who grew up without computers, might question technology expenditures.

The Computing Seniors/Computing Parents program has three main goals: to train citizens to use computers, to build positive public relations, and to help citizens understand the use of technology in schools. The four-year-old program offers classes after school hours, usually in the evening. About 500 citizens now participate annually, and 500 additional names are on a waiting list for the next cycle of courses. Clearly the program is addressing an important need.

Highland Park Learning Center Principal John Lensch started the program in spring 1996. He received a $500 minigrant from Superintendent

Wayne Harris out of a special fund intended to encourage innovative practices. Recognizing that school computers were dormant in the evenings, John seized an opportunity to give senior citizens a renewed sense of learning. An added benefit was encouraging a politically potent group to see the value in supporting schools through local and state taxes.

Highland Park, a magnet school in southwest Roanoke, has a special focus on technology. As the Computing Seniors program got underway at Highland Park, an article in the *Roanoke Times* created widespread interest in the idea, and other educators inquired about starting similar programs.

Seeing the growing level of interest, John wrote an article for *Educational Leadership*, a national education journal, describing the potential of Computing Seniors to restore public confidence in public schools.[8] In August 1997 an article in *Parade Magazine* drummed up interest on an even wider scale.

Eventually, young adults, whose children and parents were becoming more skilled with computers than they, felt left out of the mix. These adults, while not truly senior citizens, requested the opportunity to enroll in Computing Seniors. Sensing both a need and an opportunity, the Roanoke City Public Schools expanded the program to become Computing Seniors/ Computing Parents.

The computing courses for senior citizens and parents run from 10 to 12 weeks in length. The initial courses cover topics such as basic terminology, Windows, and word processing. Later offerings include topics ranging from software packages—such as PhotoShop and Adobe Acrobat—to the Internet, scanners, and digital cameras. Enrollment is just $10, but even this small fee can be waived for those demonstrating special financial needs.

Program instructors are drawn from a cadre of Roanoke classroom teachers who are knowledgeable in technology. These teachers receive a special stipend of $1,500 for providing technological support and receive additional pay if they teach courses. Another school employee serves as a paid instructional aide for the Computing Seniors Program in each school. This is often a support staff member whose duties range from copying materials to assisting senior citizens during practice activities.

Senior citizens and parents receive a certificate for each course they complete and can continue enhancing their skills through subsequent courses. David Baker spends some of his time helping people find the right course and the right instructor to address specific needs, but the operation is managed largely by each school.

Success stories abound in the Roanoke program. One senior citizen enrolled in a course because she was interested in genealogy. After learning the basics, including how to access information on the Internet, she explored various genealogy Web sites on the computers at her local library. She downloaded software from the Internet and recorded her family tree on disk.

Training has enabled another senior citizen to communicate via e-mail with her daughter stationed at a military base in Germany. A recent retiree wanted to stay busy but could not handle heavy, physical labor. His newly acquired skills allow him to do computer work sitting at a desk. One mother said she simply wanted to keep up with her children, who were quickly gaining computer skills at school. She felt embarrassed that her third grader could use a computer and she could not. Another example is a woman who wanted to store her recipes in a database for better organization and retrieval.

The program John Lensch piloted at Highland Park began with a few senior citizens and mushroomed into a citywide program with a life of its own. Since that first course in the spring of 1996, the program has been expanded all around the city of Roanoke. Seventeen schools offered courses as a part of the Computing Seniors/Computing Parents in 1998-1999.

The program is now an ongoing part of Roanoke City Public Schools. Director of Technology David Baker manages and administers the program, oversees the budget, and works with building principals to set up and staff courses. Publicity has prompted inquiries from as far away as California from educators wondering how to set up similar programs. David has developed a package of materials that provides assistance to local schools for establishing such a program.

Funding

An annual budget of $49,000 supports Computing Seniors/Computing Parents. In sharp contrast to nearly all other programs described in this book, the program has obtained no external funds to implement or to keep it going. Roanoke City Public Schools covers the main cost—salaries for those who teach the courses. Clearly, Superintendent Wayne Harris believes this program makes a special contribution to the local community and helps build the kind of public support John Lensch originally had in mind.

Outcomes

The program has been well recognized since its inception. McGraw-Hill bestowed on the program a 21st Century Schools Technology award for planning in 1996 and again in 1999. The Virginia Department of Education and Virginia Board of Education recognized it with an Exemplary Technology Award in 1995. It also received an honorable mention in the Magna Award competition in March 1998.

Additionally, the program has accomplished its goal of creating support for public schools among community members, as John Lensch observes, "More seniors are volunteering to tutor and read to children and to help school staff through a variety of support roles."[9]

Challenges

The minigrant and hard work helped overcome the main challenges in getting the program started. As the program expanded to other schools, new challenges emerged. Some schools lacked space and equipment; in all cases, it was difficult to find instructors willing to add new duties to their existing teaching responsibilities. Expanding the program across multiple sites created a need for guidelines, procedures, and coordination. The program has now settled into a steady state. With a predictable and stable budget, services can be offered at an appropriate level. Regular financing has solved many of the problems that other programs in this book continue to confront.

Several lessons have come out of this program. First, it is possible to foster community learning and, at the same time, local support for technology in schools. Second, innovative ways to use computers when school is not in session can be found. Third, gaining public support makes it easier to obtain local school funds to support ongoing technology efforts. This program will not disappear from the school budget as long as the local constituency is kept informed and involved. Fourth, school employees respond when they are challenged to be innovative. Computing Seniors/Computing Parents was possible because a school leader saw both a need and an opportunity.

For more information, contact

David S. Baker
Roanoke City Public Schools
40 Douglass Avenue, NW
Roanoke, VA 24012

dirtech@roanoke.infi.net
Phone: 540-853-2312
Fax: 540-853-6063
URL: http://www.roanoke.k12.va.us/

Chapter 4

Patterns of Promise in the Use of Technology

Patterns of Promise in the Use of Technology

We've now completed a tour of all 12 exemplary programs, though more could be said about each. The descriptions have concentrated on a limited number of features, including program goals, instructional strategies, assumptions about learning, technology use, amount and sources of funding, evidence of success, and challenges encountered. Further, the descriptions are based primarily on interactions I had with the program coordinators and the information they provided. This is a roundabout way of acknowledging that the snapshots of these programs are limited and must be interpreted in that light.

Readers should keep in mind that the descriptions are static in nature, which can be misleading because the programs are dynamic and changing. Even if I've produced reasonably accurate snapshots, it's much like a photo of a moving object—a fast-moving locomotive comes to mind. The shutter on the camera opens momentarily to capture a moment fixed in time, but the scene changes before the film can be developed. The descriptions here do not capture movement in the programs.

Within this context, I've identified several "patterns" running throughout the programs. If you've taken the entire tour, starting with the first description and reading straight through to this point, you've developed your own ideas concerning what the programs have in common. If so, compare your thoughts about patterns with mine. Like the characters in the old black-and-white film *The Eye of the Beholder,* starring Richard Conte, each person will have a personal interpretation of the patterns. You also may see implications for your own school.

Teacher Reasoning Provides the Impetus

From my perspective, the most important and satisfying pattern is that educators, particularly teachers, look for ways to make learning more meaningful for children. Despite widespread pressures to "cover" an ever-expanding curriculum and prepare students for high-stakes tests, the leaders of these programs have shown determination to let students take active roles in their learning, pursue personally relevant questions, and conduct inquiry that is not confined to any particular textbook. They engage in real reform, with technology playing an important role.

Computers support student and teacher learning. Just as hammers and saws are important tools in a woodworking course, computers are the tools of these programs. Aspiring carpenters must first learn how to handle a saw before using it to build something. Likewise, teachers and students need to learn the basics of a computer before using it to accomplish other ends. These programs provide various examples of teachers creating learning activities in which students use computers as a tool:

- enabling high school Spanish students to communicate with elementary school teachers via e-mail
- helping second graders design and print greeting cards
- allowing middle school students to access information about health issues
- helping students see weather maps in action as the jet stream and air pressure systems shape and influence weather patterns

These activities exemplify effective uses of technology to support learning.

Means and Ends

Educators in these programs are solving problems, and technology is only one of the elements used to reach solutions. Technology is not an end in itself but a means to an end. The teachers do not employ technology because of recent trends but because it can enhance good instruction. This is a statement of judgment, of course, so let me explain what I mean.

A *good use of instructional technology* is one that facilitates learning. Anything that allows the learner and the teacher to make a good start and proceed efficiently has the net effect of being good for learning.

Ample evidence suggests that students learn when they are *motivated* and *active*.[1] Good teaching

- connects what learners already know about a topic to the curriculum
- enables learners to shape their own learning by pursuing their interests
- links the learner and the instructional goals, whether acquiring facts, building concepts, developing attitudes, learning skills, or enhancing abilities

Technology gives instant access to stores of information previously unimagined. The search for information is exciting and empowering. Technology supports learners as they explore topics, making greater information available from a wider array of sources. Technology allows individuals to follow their own predilections and hunches, giving them both the power and space to explore. These elements motivate learners. Technology also helps the learner present what has been learned about a topic in effective and attractive ways (e.g., CAD, PowerPoint, Photoshop).

Technology has the power to allow learners to interact with human, digital, and printed sources of information. Through *good uses of technology,* learning can be active and hands-on in nature. Computers can be the means to an end—a better end for students who take charge of their own learning. The key pattern evident in all the programs is that they use technology to facilitate student learning.

Learning Involves Collaboration/Cooperation

Many of these exemplary programs use a team approach to student learning. Working collectively with others in the use of technology can enhance learning; the opposite effect often occurs when students simply work alone at their own terminals.[2] The Tech TEAMS, STARS, One Heart, and TOTS II programs demonstrate how student teams can use technology. Even The Florida High School's independent learning approach offers numerous opportunities for students to collaborate, usually on-line as part of threaded discussions or in chat rooms, but occasionally in face-to-face meetings. These exemplary programs defy the conventional wisdom that technology isolates learners by using computers to promote collaboration and cooperation among learners.

Success Is Being Documented

In today's world, educational innovations are expected to produce results. Accountability has become the watchword of the day; unfortunately, the people who typically write the rules and regulations are located far from the school programs. Traditional notions about the value of standardized tests tend to crowd out and overshadow other measures of program success. This is a loss because informal measures often prove to be the most direct and useful for assessing student growth and helping teachers understand student needs.[3]

An important pattern in these programs is that the educators are keenly aware of the need to demonstrate positive impacts. They have examined the impact of program activities on student achievement in writing and math and in knowledge of technology. Many of the program coordinators have documented evidence of success. Geneva Storey in the SAFFE program and Susan Kirkpatrick in One Heart determined success from student performance, student enrollment data, and responses to teacher surveys. These data relate directly to the program goals. In One Heart, for example, there is no better or more authentic way to determine success in running a business than to observe how each student behaves in a "company meeting," making decisions about product development and the advertising budget. From my perspective, this evidence is more convincing than traditional paper-and-pencil tests, which leave room for inaccuracies (sampling errors, for example, and errors due to student guessing).

Only a few of the programs use scores on standardized achievement tests to measure success. The reason seems obvious: such tests are broad in content and do not link to the outcomes of these programs. Programs such as SAFFE and Primetime develop a student's ability to collaborate and appraise information found on the Internet. The Stanford 9 and other national achievement tests do not assess growth in these abilities.

To demonstrate success, innovators need to gather both kinds of data—quantitative and qualitative information—through formal and informal data collection procedures. Educators should go beyond what policymakers demand to provide additional evidence that is less formal (gathered through observation and interpretation) yet more directly related to program goals. The challenge is to transform and report these informal data in a manner that cannot be discounted or dismissed as unreliable. Triangulation becomes an important consideration, calling upon several sources of data for each goal. Action research procedures, such as those gaining favor in the teacher-as-researcher movement, will also be helpful in generating this kind of evidence.

A program like CATCE, which aims to help students make informed career choices, will need to gather relevant evidence in creative ways. Teachers can review entries in student journals for indications that classroom experiences have had an impact on their thoughts about career choices. Written surveys could elicit students' thoughts about careers before and after their semester at CATCE. A program like Primetime could use a rubric or set of standards to determine whether the children's news scripts demonstrate writing improvements over the course of a year. Likewise, a program like Tech TEAMS might want to tabulate the actual amount of time special education students spend in regular classrooms. In another instance, Maryville Middle School could evaluate students' final reports for clarity, accuracy, thoroughness, or other appropriate standards. To me, these evidences of program success are more revealing than performances on any standardized achievement test.

In summary, the successful project-approach programs display the following common characteristics:

- The goals are clearly stated.
- The evidence relates directly to program goals.
- The evidence of success emerges from daily activities.
- Multiple sources of data indicate success.
- Traditional measures are buttressed by informal measures.

Innovation and Accountability Are Compatible

Program success is related directly to another imperative educators confront today: accountability for student mastery of content and skills as specified by various state curriculum standards. In a perfect world, programs enjoying documented success would be immune from further accountability concerns; achieving program goals would be sufficient. But this is not a perfect world, so the creators of innovative programs must also pay attention to paper-and-pencil tests, dubbed by some as high-stakes testing.

Intended or not, policymakers' zeal for accountability has replaced the professional judgment of teachers on curricular matters. This is an unfortunate development, in my opinion, because it often equates learning with acquisition of facts through rote memorization. It also reduces teaching to the act of disseminating knowledge. State curriculum standards now stipulate which Egyptian pharaohs children must be able to name by the end of third grade. The standards movement has attempted to eliminate the mystery about what students must learn to be judged "educated."

Educators could be excused for taking a simplistic approach that makes sure the "right" information gets into children's heads. Computers often play a role in this scenario, serving as means for both presenting and assessing information. This paradigm, however, ignores the potential power of computers by reducing them to little more than expensive electronic workbooks and study guides.

While specific content is a major feature of the standards movement, states have not yet specified *how* children are supposed to go about learning it. With a few notable exceptions related to the teaching of reading, methods of instruction are left typically to the discretion of professional educators.[4] One approach taken in some of these exemplary programs is to include content stipulated by the state while using instructional strategies that make the learner *active*, perhaps even giving students a *choice*. Students learn the required content by conducting an inquiry that links an assigned topic to something that intrigues them—mummies, for example, or the mystery of the Sphinx, or the origin of the pyramids. Asking higher level questions can entice children to apply what they already know about a topic rather than simply memorizing facts. This approach links instruction to state goals, but adds excitement to learning the content. The programs described in this book illustrate the power of computers to support this kind of inquiry. They also illustrate how innovations that use technology can be made consistent with the accountability movement.

Several of the programs (Primetime, CATCE, The Florida High School, and TOTS II) link instructional activities to state curriculum standards (as well as state technology standards) but do not allow the standards to serve as the entire curriculum. Rather, the programs take pains to ensure that state standards are addressed as a by-product of meaningful learning activities. The key elements are employing a variety of instructional strategies to address state curriculum standards and using technology to support student inquiry.

Partnerships Have Value

Many of the exemplary programs have developed partnerships with business and industry and involved parents and the community-at-large. Partner support varies from financial to "hearts and hands." Partnerships strengthen and validate a program by giving it authentic connections to the real world. Parents and business leaders often are in good positions to offer advice and shape the direction of a program. In the area of technology, community partners can identify the kinds of competencies learners will need to be successful after graduation.

Partners are especially helpful when the value of a program cannot be quantified easily. They have credibility in the community, and their observations about program outcomes carry weight. They are free to express to policymakers their support for a program or the school. A school isolated from its community misses this opportunity for support and, consequently, puts itself at risk. The primary goal of Computing Seniors/Computing Parents is to gain community support for using computers in local schools. One Heart is an example of another good partnership, drawing upon the expertise of local businesses.

In summary, partners can

- keep a program in sync with the expectations of the community
- offer support in a variety of ways, including politically
- help document the successes of a program through testimony and firsthand accounts

Good Ideas Travel Well

The primary goal of *Patterns of Promise* is to help educators learn from the experiences of people who have developed successful programs. Because circumstances are seldom the same from one school to another, exemplary practices will require adaptations to transplant. Each program, however, contains the spark of an idea that may inspire others. Programs such as WebQuests and Online Projects, Technology Upgrade for Educators, and Computing Seniors/Computing Parents are freestanding and can be implemented almost anywhere with little adaptation. Programs such as Primetime and STARS would require extensive development of technology infrastructure. The lesson to be learned from SAFFE is that unique local circumstances present opportunities.

When attempting to transplant an idea that has been successful else where, ask yourself these questions:

- If we want to build on one of the ideas described here, how is our situation similar to the conditions that produced the program? How is it different?
- What does the program accomplish? Do we have a similar need?
- What changes or adjustments would be necessary to make such a program work in our school?
- Can the content or focus of a program be changed to achieve similar results in a different domain?
- What infrastructure (equipment and personnel) for technology would be required? How does our existing infrastructure stack up?
- Can the same reforms be accomplished in other ways?

Regardless of whether an idea needs adaptation or can be adopted as it stands, educators trying to enhance their instruction with technology can take many paths to success. The most important steps are making a commitment and getting started.

Successful Programs Gain Attention

Another common pattern is that successes are being shared with other educators and the general public. At a time when appropriate use of school technology is very much on our minds, stories about effective computer-related programs make an important statement. Getting the story out takes effort. Someone took the time to nominate these programs for recognition, and nearly all are posted on the Web. At one time or another, the local press spotlighted each of these programs. Details of the programs have been shared at professional conferences, and several have been featured in national publications—both popular and professional. Some have been recognized with state and national awards. Public awareness is important in shaping public education policy. In addition, it takes many good-news stories about successful education programs to offset the damage caused by one bad-news story. Gaining attention is important; because educators are human, their morale improves when the public hears positive reports about new initiatives, especially those involving technology.

Here are three key suggestions for promoting your program:

- take seriously the value of disseminating information
- develop a specific plan for sharing your program with various audiences
- take advantage of the Web, educational conferences, and the local press

Professional Development

Each of these programs pays special attention to teacher competence in technology. Computers and other instructional aids should not be placed in classrooms for teachers to figure out on their own. Several of the exemplary programs were set up specifically to help teachers learn how to use computers for instruction. Even in those programs where professional development is not the main goal, teachers learn about technology before infusing it into their instruction.

The number of professional development programs selected indicates how important this activity is in the minds of educators, including the expert panel. Further, the training programs described in Chapter 2 respond to such research-based notions about what is necessary for effective professional development as making time available for teachers to learn or offering incentives for participation.[5] The instruction in these professional development programs is hands-on in nature, provided by teachers who are extremely knowledgeable in technology. The training emphasizes instructional applications of computers, focusing on learning activities that enhance the regular curriculum, not just adopting software packages or turning instruction over to computers.

A major challenge in providing technology professional development is matching the level of instruction to the readiness of teachers to learn the content. Instruction on multimedia software is meaningless to a teacher still learning to do word processing. For the most part, these professional development programs allow teachers to decide for themselves which training sessions fit with their personal needs. A one-size-fits-all approach is not forced upon them.

Some of these programs demonstrate that the various components of a school's technology infrastructure cannot be addressed once and then taken for granted. Improving infrastructure requires continuous attention, exemplified by these projects that acquired hardware and software and helped teachers use them effectively. Several strategies are helpful when implementing an effective technology professional development plan:

- develop a plan that enables teachers to become competent with technology
- invite teachers to help shape the professional development plan and decide for themselves how they want to participate
- make time available for training
- offer incentives for participation
- recognize and celebrate the growth of teacher technology competency

Time Management Produces Results

Although nearly every program coordinator cited a shortage of time as one of the challenges, these programs demonstrate effective time management. The lesson here for other educators is to use time strategically—decide which activities are the most important. Set priorities so time can be devoted to the activities that offer the greatest return for the effort invested. These programs offer several tips for managing time effectively:

- set priorities and budget time accordingly
- manage time the same way you would manage any resource
- weigh the cost and benefits of spending time on a particular activity

Exemplary Programs Are Multifaceted

The organizational framework I've used oversimplifies the nature of these exemplary programs. It highlights one particular aspect (such as professional development) over other features. A more complete picture would illustrate that nearly all the programs are multifaceted. Tech TEAMS, for instance, is grouped with the professional development programs, but it is equally an inquiry-based program and a school reform program. Likewise, STARS is categorized with other project-based programs but includes a strong professional development component. Several of the programs, such as Tech TEAMS and CATCE, make special efforts to include children with special needs. Accordingly, I offer another pattern inherent in these programs: each addresses several goals concurrently in a coordinated fashion. Moreover, these programs embrace technology as more than a simple "add on”; technology addresses multiple needs. For example, TOTS II uses technology to teach writing as well as science and math. Developing a multifaceted program requires

- looking for opportunities to integrate diverse ideas
- allowing for complexity

Technology Creates Synergy

In a related point, many of the programs combine different kinds of technology. Primetime uses computers in conjunction with videotaping, while CATCE has linked computers with robotics.

Because technology creates synergy and generates natural excitement, reformers tend to get caught up in the rush to use the latest and greatest items as soon as they become available. Funding alone often tempers this tendency, but when the money is available, be cautious about adding the latest equipment at breakneck speed. The focus should not be on acquiring the biggest and the best technologies but on helping students learn to use the technology already available. Strategies to avoid wasteful technology practices include

- asking whether you can achieve the same end with existing technology
- resisting the latest technology trend until you determine how it can support learning

Programs Proceed in Stages

Despite different settings, each program seems to go through a series of predictable, perhaps overlapping, stages. These stages of innovation can serve as a blueprint for other educators:

- assess local needs
- engage in planning
- obtain resources (including funding, personnel, and infrastructure)
- provide professional development opportunities
- implement the program
- undertake formative evaluation
- revise for sustainability
- conduct summative evaluation

Technology Creates Products That Last

In several of these programs, teachers and students have created unique products such as curriculum units, videotapes, and final reports. Some products have been posted on the Web; others have been placed in the school library or resource center. It may seem obvious, but these products represent building blocks for subsequent learning activities. Teachers and their students can start where someone else left off, extending the work in new directions. In other words, the products created in pursuing an innovation can take on lives of their own. When planning a product,

- think about whether learners can sustain it beyond the life of the current project
- consider extending the work you or others have already done

Organizing for Technology

Any organization divides duties and responsibilities in some fashion. Depending on the size of a school system, and especially the size of the central office staff, one or more individuals will be responsible for curricula. In larger school systems, someone may have responsibility for reading/ language arts, for example, and someone else for special education. Likewise, someone oversees business operations, such as the budget.

At the outset, I wondered if the exemplary programs fit into the school organizational structures in any particular pattern; however, program coordinators hold a variety of positions. Geneva Storey, Brenda Bleigh, and Susan Kirkpatrick are classroom teachers; Ric Potts, Jay Strickler, and Joel Griffin are school principals; Mary Robertson and Trina Holly are technology teachers assigned to single schools; and Robin Hurst is Program Coordinator for Exceptional Students in her district. Only a few—Marcie Altice, Dianne Owen, and Judy McDowell—work with technology at the system level. Marcie offers technical assistance in a Challenge Grant program, Dianne writes grants and works with technology in a small school system, and Judy is responsible for student support programs such as special education and technology. Two of the coordinators, Lynn Blanton and David Baker, hold district-level positions devoted exclusively to technology.

What does this tell us about the way school systems have structured themselves to promote instructional technology? Based on these 12 projects, technology seems to be an afterthought of school organizational patterns, with no common thread for administering and supporting technology. Few of these school systems have a cadre of specialists trained in technology. The common pattern involves teachers, usually serving as unpaid volunteers to train their colleagues in technology use and provide technical support. While I'm enormously supportive of programs in which teachers help teachers, this pattern suggests that school systems have not yet addressed technology at an organizational level.

I also discovered that most of these school systems have a technology committee of some type, although their natures vary. Some committees assume a quality assurance or leadership role, as in Poquoson, where a division technology committee helps Judy McDowell identify instructors and topics for the professional development program. Other committees, such as that in Franklin County, Virginia, assume a technical assistance role. Typically, these committees are composed of unpaid volunteers who meet to support one another and discuss how to assist their fellow teachers.

With a few notable exceptions, such as in Memphis, school systems have not established a technical support staff with the time and training to succeed. Technology has been added to the portfolio of administrators who may or may not have the necessary expertise. It also appears that classroom teachers carry much of the burden for implementing technology. Key points about this pattern include the following:

- organizational structures must address technology more directly and explicitly
- schools need staff trained in technology

Funding

I've saved the hardest pattern for last. Whenever questions are asked about improving education, eventually the discussion comes around to funding. What funding patterns emerged throughout these exemplary programs?

Special Funding. Leaders of these exemplary programs identified needs and took initiatives to make a difference, often by seeking special funding for their ideas. All but one of the programs received funding from external sources. It seems especially significant that funding comes most often from outside the local school system, typically state governments. Looking at this positively, it's encouraging that dedicated professionals recognize when a need exists and take steps to address that need. In the same vein, it's a good sign that various agencies and legislative bodies have anticipated these needs by appropriating funds to support the infusion of technology into schools.

The "glass" can be seen as half full or half empty. It's half full if one looks at state and national funding but half empty regarding local support. Local support played little role in these programs. The Computing Seniors/ Computing Parents program is the only one here that was launched with and is sustained by local funds. Costs associated with technology are high, but local policymakers and taxpayers cannot ignore or dismiss them as someone else's responsibility. State and federal funds are provided to "seed" programs—get them started—generally with an explicit expectation that the programs will be sustained through local funding. Without local support, what happens when state and federal funding end?

Business leaders often call for schools to use technology because the students are potential future employees; however, businesses have the luxury of recovering their technology investments by raising prices. Schools do not have this option. Most taxpayers and school boards are accustomed to purchasing a new set of textbooks once every 7 or 10 years. Acquiring computer equipment requires them to adjust their thinking. To keep schools up-to-date with developments in technology, everyone with a vested interest in the outcome of education must understand the associated costs.

Small amounts of funding may suffice. Following the funding theme just a bit further, another pattern seems evident. Large amounts of money clearly are *not* a requirement for doing something innovative with technology. In fact, several of these programs used very little additional funding—several operated on a budget of less than $2,000, and one had a budget of only $1,000. Admittedly, these and other low-budget programs depend on the existence of a technology infrastructure, but they have leveraged that infrastructure in cost-effective and educationally useful ways. I'm not suggesting that the quality of an education program is unrelated to funding, but these programs demonstrate that small amounts of money can pay tremendous dividends when invested in the teachers' innovative ideas.

Government assistance and grants. Many states have invested substantially in helping local school systems create technology infrastructure. Funding for teacher technology training is also available but to a lesser extent. In the southeastern United States—from which these 12 exemplary programs were chosen—Tennessee, Florida, West Virginia, and Kentucky, in particular, have made major financial commitments to school technology.

Some federal money is available as well, principally through the Technology Literacy Challenge Fund and Technology Innovation Challenge Grants. Hidden among this good news is the fact that these grant programs require someone to write a proposal, administer the funds in compliance with stringent government accountability requirements, and write a final report. Educators with the expertise to teach students and fellow educators about computers have a limited amount of time. Should they spend that time writing proposals and completing paperwork? A pattern in these exemplary programs suggests that technology specialists are being diverted from the activities they are best equipped to handle: teaching about technology and supporting teachers in the use of instructional technology.

Initial funding often attracts additional support. A final point with respect to funding is that funding begets funding. In several of the exemplary programs, an initial grant for technology produced support for related initiatives from entirely different sources. Successful programs attract additional support. CATCE is perhaps the best example, but the Central West Virginia Technology Upgrade for Educators, The Florida High School, SAFFE, and Primetime also caught the attention of multiple supporters. Given the American penchant for making funding available on a competitive basis, we can assume these programs were rewarded because they had been successful.

This phenomenon has the unfortunate side effect of concentrating resources in only a few locations. With money for technology at a premium, more and more schools and school systems are chasing the same funds, meaning that some very good ideas will not be funded. This gives a distinct advantage to school systems that can afford to hire a person who writes grants.

What Are the Implications for You?

At the risk of oversimplifying the situation, here are a few key points to consider as you move forward to use technology in your school.

- **Begin with the infrastructure.** Give first priority to getting the necessary equipment and software in place and to offering training that builds teacher competence with computers.
- **Create an environment that supports risk taking.** People will be more willing to try if they know an occasional failure will be viewed as a learning experience.
- **Hold high expectations.** Don't assume that rural, remote, or low-income will spell failure before you start. As the programs in this book demonstrate, good ideas can sprout and succeed anywhere.
- **Encourage new ideas.** Innovative concepts are more likely to succeed when those responsible for carrying them out have had a voice in the decision to proceed.
- **Set clear goals.** Know in fairly specific terms what you want to accomplish.
- **Plan carefully.** Make sure the activities are linked directly to the stated goals.
- **Collaborate frequently.** Implementing innovations when isolated from others can be lonely and frustrating.

- **Don’t wait for everyone.** Start with those who are already disposed to innovate; let others come along at their own pace.
- **Get started.** The first step is the biggest of all.
- **Don’t let funding hold you back.** Decide what you really need and look for financial support, but don’t let a lack of funding block the innovation; remember that funding is easier to get after a program is underway and enjoying success.
- **Budget time.** Remember, it takes time as well as money to produce a successful program.
- **Keep looking for support.** Funding agencies often are willing to match funds you’ve raised elsewhere.
- **Evaluate and celebrate.** Look for unique ways to document your achievements and recognize your successes.
- **Keep it flexible.** At the outset, create an evaluation plan that provides both formative evaluation—continual information that can be used to revise the program—and summative evaluation—evidence regarding the achievement of your goals.
- **Don’t limit yourself to traditional measures of success.** Gather information produced by daily activities.

Computers Are No Quick Fix

I pointed out in the beginning that computers have enormous potential for improving schools, which probably seemed like a timid way to launch the discussion. Some observers might comment that computers have already demonstrated their power to improve schools.[6] These 12 programs lend a small amount of credence to such a conclusion. But are these programs typical? Each used computers to support the way teachers teach and learners learn—a good recipe for success. I’ll be pleased if this approach gains widespread acceptance, but I’m concerned that computers will continue to be regarded as a panacea—a quick fix for schools.

The mere presence of computers has raised the public’s expectations for schools.[7] Now, in addition to teaching reading, writing, math, family life, and moral character, schools must teach computer literacy and incorporate computers into instructional activities. I’m concerned that our society constantly adds more to the school agenda with no apparent regard for what will be neglected as a result. I also worry that technology expenditures will raise the accountability stakes even higher and place even more emphasis on test scores.

To make learning more meaningful for children and more lasting in its effects, we must find ways to reform what goes on in the classroom, most notably by building learning experiences around children's natural curiosity about the world. This view has implications for the role of the teacher and the type of learning environment the teacher creates. In this context, technology can effectively support a different approach to teaching and learning.

Standards for Selecting Exemplary Programs that Represent "Best Practices in Using Technology for Instruction"

Evaluation Procedure

Please utilize the following scale to measure indications of each of the ten standards for each program application. Record your score (from 0 to 4) either on the electronic file or the included tally sheet.

0 – No evidence is provided indicating that the standard has been met.
1 – Little evidence is provided indicating that the standard has been met.
2 – Some evidence is provided indicating that the standard has been met.
3 – Ample evidence is provided indicating that the standard has been met.
4 – Extensive evidence is provided indicating that the standard has been met.

Not all standards bear the same weight. You do not need to tally any of your evaluations. The following weighting code is simply for your information.

Evaluation Standards

Score x 4	**Standard 1 (Goals to Outcomes):** The program is designed to address important educational outcomes that benefit all learners in a highly effective manner. **Standard 2 (Use of Technology):** The program makes effective use of technology.
Score x 2	**Standard 3 (Populations Served):** The program involves all learners. **Standard 4 (Innovation):** The program is innovative. **Standard 5 (Replicability):** The program can be replicated in new locations. **Standard 6 (Assessment):** Assessment of student learning and overall effectiveness is an integral part of the program.
Score x 1	**Standard 7 (Partnerships):** The program involves partnerships with the community (including business and industry where appropriate). **Standard 8 (Cost Effectiveness):** The program makes effective use of available resources. **Standard 9 (Flexibility):** The program is flexible enough to accommodate unexpected events. **Standard 10 (Sustainability):** Local commitment has been made to continuation of the program.

Evaluation Form

Standard	Criteria	Pts. A (0-4)	Wt. B	Total A x B
1. Goals to Outcomes	• The goals of the program are tied directly to enhancing student learning. • The goals of the program are educationally significant. • A research base exists to support the nature of the program. • The effectiveness of the program is supported by outcome measures—both formal and informal.		4	
2. Use of Technology	• Technology is used to enhance student learning • Technology is used to assess student learning at various stages (before, during, and after instruction). • Technology is used in a way that encourages interaction among people.		4	
3. Populations Served	• The program does not isolate or stigmatize learning groups. • The program serves students from diverse ethnic and social groups within the learning community. • Procedures are in place to assure equity. • Diversity is in evidence among students and program personnel.		2	
4. Innovation	• The program is unique or makes a unique application of familiar ideas. • Technology that is commonly available is used in a novel way.		2	
5. Replicability	• Ideas at the heart of this program can be implemented in other locations. • Other schools/programs can borrow or otherwise adapt ideas from this program.		2	

(continued)

Standard	Criteria	Pts. A (0-4)	Wt. B	Total A x B
6. Assessment	• Assessments are based on program goals. • The program pre-assesses student learning. • The program employs continuous assessment of student progress. • The program adjusts instruction on the basis of assessment results. • Reliability and validity have been established for the measures that are employed.		2	
7. Partnerships	• Collaboration among partners is documented.		1	
8. Cost Effective-ness	• The benefits of the program are in line with the costs. • Cost is scalable and does not prohibit replication.		1	
9. Flexibility	• Adjustments have been made in the program to respond to unexpected factors. • The program has responded positively to disappoint-ments.		1	
10. Sustainability	• The infrastructure and training needed to sustain the program beyond its initial introductory phase have been established. • Necessary equipment and services have been inte-grated into the local budget so the program may be continued.		1	
			TOTAL	

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Poquoson City Schools
Technology Portfolio Requirements

Technology portfolios must contain evidence of mastery of at least the first three (3) Standards by May 1. Evidence of mastery of the next three Standards must be submitted by the following May. All Standards must be met by May 1 of the third year. Additional Standards may be met at any time in advance of the requirements. Portfolios will be reviewed by school administrators with assistance from designated personnel.

To qualify as "Evidence of Mastery," submissions must consist of items specified under each Standard. Administrators may modify the activities as appropriate to their administrative tasks. Place a check mark by the items submitted under each Standard. ***Label each item with your name, the number of the Standard it supports, and the letter of the activity.*** See note at end about submitting one document to satisfy multiple lettered activities.

YEAR ONE STANDARDS (MINIMUM)

STANDARD 1: Operate a computer system and utilize software. [*Three* of the following]

a. __ A disk on which you have saved at least two files.

b. __ The printout of two original documents created with ***different*** software (i.e., MS Works, Print Shop, PowerPoint, CrossWord Magic, HyperStudio, PageMaker, etc.)

c. __ A list of at least three troubleshooting operations you have accomplished and their dates (ex: unjammed classroom printer 2/12/99; connected cable to classroom computer 3/14/99)

d. __ A printout of information from a CD-ROM (ex: article from an electronic encyclopedia)

e. __ Demonstrate to a technology specialist your ability to set up a computer system (i.e., hook up cables, attach mouse, change print cartridge, etc.).

STANDARD 2: Apply knowledge of terms associated with educational computing and technology. [*One* of the following]

a. __ Successfully completed (score of 80% or better) “Technology Vocabulary Quiz” (available from your library media specialist).

b. __ Activity or lesson you have developed to teach appropriate technology vocabulary to your students. Reference the Poquoson Computer/ Technology Curriculum.

c. __ Printout of a multimedia presentation (HyperStudio, PowerPoint, etc.) you have developed to teach appropriate technology vocabulary to your students. Reference the Poquoson Computer/Technology Curriculum.

STANDARD 3: Apply productivity tools for professional use. [*Four* of the following]

a. __ Two professional word processing documents, at least one of which contains a graphic relating to the subject or text. Detail should be given to proper use of grammar, punctuation, and style (use of an easily read font, format, etc.) Suggestions: newsletter, list of directions, note to parents, unit outline, course syllabus, class work sheet.

b. __ A computer-generated grade report on a student or class group.

c. __ A computer-generated test or activity (not word-processed) for a class you teach (ex: a test generated from a disk accompanying your textbook).

d. __ A printout of a database of student or other professional information. This document should include at least four fields.
e. __ A printout of a spreadsheet used to record class or other professional information. This document should include at least 20 cells and one mathematical function.
f. __ A printout of e-mail correspondence (at least your message and a reply) with a colleague about a professional or curricular issue.
g. __ A computer-generated crossword, word search, or other puzzle or game (not word-processed).
h. __ A printout of Web-based information you retrieved for professional use (ex: a lesson plan or professional article from the Web).
i. __ The URL and a printout of a Web page created by you as a resource for your students and/or their parents (ex: links to sources of information about curriculum topics, schedule of assignments, news of class accomplishments).
j. __ Evidence that you have used technology to produce a bulletin board, learning center, or learning games. Evidence may vary but could include a photograph, sketch, or copy of the item.
k. __ A student activity for a class you teach, created with technology.
l. __ A printout of a digital camera image that you produced for a professional activity.

YEAR TWO STANDARDS (MINIMUM)

STANDARD 4: Use electronic technologies to access and exchange information. [*Three* of the following]

a. __ A lesson plan that incorporates students' active use of the World Wide Web. Date(s) lesson plan was actually used.
b. __ A printout of Web-based information you retrieved for instructional use (ex: resource information for students about a subject you are presenting).
c. __ Evidence of your class's participation in a Web project (the specific evidence will vary— submit something that shows what the project was and that your class participated).
d. __ A printout of e-mail correspondence between you or a member of your class and an adult "expert" at a remote site about a topic of curricular concern or interest.
e. __ A printout of an electronically generated list of sources available in your school or an area library (i.e., Poquoson Public, CNU, etc.) on a topic of interest to you or your class.

f. __ A write-up of the search strategy you used to access specific information from the Web or an information database (i.e., SIRS, EBSCO, Groliers, etc.). Include key words, path, and final URL or information gained.

g. __ A printout of a thread or of an e-mail conversation from a professional listserv you have joined (indicate name of listserv and subscription address).

STANDARD 5: Identify, locate, evaluate, and use appropriate instructional technology-based resources (hardware and software) to support SOLs and other instructional objectives. [*Four* of the following]

a. __ A printout of a digital camera image that you produced for a curriculum-related activity.

b. __ A document that contains a scanned image that you produced for a curriculum-related activity.

c. __ Lesson plan that incorporates student use of computer-assisted instruction software. Indicate date lesson plan was actually used.

d. __ Lesson plan that incorporates laser disk usage by teacher or student in an instructional setting. Include date lesson was taught or student made presentation.

e. __ Lesson plan that incorporates video usage by teacher or student in an instructional setting. Include date lesson was taught or student made presentation.

f. __ Lesson plan that incorporates use of presentation device (not an overhead projector) by teacher or student in an instructional setting. Include date lesson was taught or student made presentation.

g. __ Reviews of three instructional software programs. Include title, publisher, cost, a brief summary of each program, a critique of its effectiveness, and your determination of grade level appropriateness and applicability to curriculum.

h. __ Reviews of three Web sites that relate to your grade level or discipline. Include URL, title of site, a brief summary of site, a critique of its effectiveness, and your determination of grade level appropriateness and applicability to curriculum or professional use.

i. __ Date and usage of a camcorder in a professional or instructional setting. Include class, lesson, and objective(s).

j. __ A copy of a student or class book or a statement signed by your building administrator that you have produced a student class “big book” to support instructional objectives.

STANDARD 6: Use educational technologies for data collection, information management, problem solving, decision making, communications, and presentations within the curriculum. [*Four* of the following]

a. __ A copy of a student-generated word processing document from a class assignment. Include course, date, and lesson objective.

b. __ A copy of a student-generated database from a class assignment. Include course, date, and lesson objective.

c. __ A copy of a student-generated spreadsheet from a class assignment. Include course, date, and lesson objective.

d. __ A copy of a student-generated desktop publication (ex: newspaper, flyer, advertisement, illustrated story, etc.) from a class or extracurricular activity. Include information about the purpose of the activity.

e. __ Evidence of your class participation in a Web project (the specific evidence will vary— submit something that shows what the project was and that your class participated)

f. __ A printout of e-mail correspondence between a member of your class (with teacher assistance if necessary) and an adult expert at a remote site.

g. __ A printout of a multimedia presentation (i.e., PowerPoint, HyperStudio, etc.) generated by you for a professional or instructional purpose.

h. __ A printout of a multimedia presentation (i.e., PowerPoint, HyperStudio, etc.) generated by your students. Include lesson objective(s).

i. __ The URL and a printout of your class Web page.

j. __ Date of usage of a presentation device (i.e., LCD pad, data projection system, etc.) in a professional or instructional setting (not to include overhead projector!). Include objective.

k. __ A copy of a student or class book or a statement signed by your building administrator that you have produced a student class big book to help present curricular material.

l. __ A copy of a management plan developed by you to assure frequent and equitable use of classroom computers or other technologies by your students.

YEAR THREE STANDARDS (MINIMUM)

STANDARD 7: Plan and implement lessons and strategies that integrate technology to meet the diverse needs of learners in a variety of educational settings. [*Must do item a.*; select one additional from the remaining choices]

a. __ The signature of your principal or designee indicating that they observed a lesson that successfully included student use of technology.
b. __ A bibliography of resources on a specific curriculum topic that you created using your school's electronic information databases and/or electronic catalog.
c. __ A lesson plan that utilizes the one computer in your classroom. Indicate date lesson was taught.
d. __ A lesson plan that utilizes the computer lab. Indicate date lesson was taught.

STANDARD 8: Demonstrate knowledge of ethical and legal issues relating to the use of technology. [*Required*]

a. __ Read the document entitled *Copyright: Use of Copyrighted Materials by Poquoson City School Employees* or attend a staff development session that reviews the document; sign and submit a statement that you have read it and agree to abide.

The SAME sample may be submitted for more than one Standard if it combines elements of more than one lettered activity. For example, one document may incorporate word processing and a spreadsheet and thereby satisfy two items. Likewise, if your Web page contains several distinct sections (i.e., student work as well as resource information for parents and/or students), it could satisfy requirements for both 3i and 6i. However, ONE lesson presented with a presentation device will not suffice for both 5f and 6j. Final judgment will be made by the administrator reviewing the submissions.

Notes

Notes to Preface and Introduction

1. Fullan and Stiegelbauer, *New Meaning of Educational Change;* Schlechty, *Schools for the 21st Century;* Sarason, *Predictable Failure of School Reform;* Goodlad, "On Taking School Reform Seriously"; House, *Schools For Sale.*
2. EdLiNC, *E-rate*.
3. Branigan, "New ITEA Tech-ed Standards."
4. Grabinger, "Rich Environments."
5. National Center for Education Statistics, *Internet Access;* Fatemi, "Building the Digital Curriculum."

Notes to Chapter 1

1. Darling-Hammond, *Right to Learn*.
2. The *Primetime* program builds on a project-based approach to school reform known as Co-NECT. Technology plays a key role in all Co-NECT projects. Co-NECT (http://co-nect.com/) was founded by a group of educators at BBN, a company in Cambridge, Massachusetts, that was instrumental in developing the Internet. The Co-NECT Web site describes it as "one of the original design teams selected by New American Schools to implement comprehensive school reform aimed at significant gains in student achievement. Co-NECT uses a research-based educational model that stresses community accountability for results, learning by doing, and the sensible use of modern technologies." Primetime was selected as a Break the Mold school in a competition sponsored by the New American Schools. BBN won the competition in 1992 with work that began in a single school in Worcester, Massachusetts. Today, Co-NECT works with 115 schools at all levels in 22 states.

Notes to Chapter 2

1. Riley et al., *Getting America's Students Ready*.
2. Edwards, "Technology Counts."
3. Virginia, "Technology Standards"; Superintendents Memo No. 2, April 17, 1998.
4. Daresh and Playko, *Supervision as a Proactive Process;* Wildman and Niles, "Essentials of Professional Growth."
5. Fatemi, "Building the Digital Curriculum."
6. Dwyer, Ringstaff, and Sandholtz, "Changes in Teachers' Beliefs and Practices," 50.

Notes to Chapter 3

1. Harris, “CATCE,” 18.
2. Betty Vail, personal e-mail communication with Phyllis Lentz, 16 February 2000.
3. Julie E. Young, personal e-mail communication with Phyllis Lentz, 28 March 2000.
4. Young, “Florida’s Virtual High School,” 6.
5. Julia Carpenter, personal e-mail communication with Phyllis Lentz, 16 February 2000.
6. National Commission on Excellence in Education, *Nation at Risk.*
7. Berliner and Biddle, *Manufactured Crisis*; Bracey, “Second Bracey Report”; Cuban, “Reforming Again.”
8. Lensch, “High-Tech Magnet for Seniors.”
9. Ibid., 66.

Notes to Chapter 4

1. Dweck, “Motivational Processes”; McCombs, “Role of the Self-Esteem”; Schunk, “Social Cognitive Theory.”
2. Cunningham, Duffy, and Knuth, “Textbook of the Future”; Savoy and Duffy, “Problem Based Learning”; Shute and Psotka, “Intelligent Tutoring Systems”; Bush, “Effects on Student Achievement.”
3. Airasian, *Assessment in the Classroom;* Taylor et al., *Reading Difficulties.*
4. Coles, *Misreading Reading.*
5. Daresh and Playko, *Supervision as a Proactive Process;* Wildman and Niles, “Essentials of Professional Growth.”
6. Mann et al., *West Virginia Story;* Schacter, *Impact of Education Technology;* Sivin-Kachala and Bialo, *Research Report.*
7. Ely, “Technology Is the Answer!”

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About the Author

Larry Harris is Professor and Program Area Leader for Elementary and Literacy Education at Virginia Tech. Since 1974, he has served in various capacities, including Associate Dean of the College of Education, Associate Dean of the Graduate School, and Executive Assistant to the President.

Harris taught in Minnesota public schools before earning his Ph.D. from the University of Minnesota in 1967. He was an instructor at Indiana University and the University of North Dakota before moving to Virginia Tech.

His publications include several college textbooks about the teaching of reading, research about reading instruction in a number of professional journals, and the teacher's guides for a basal reading series. He also consults widely as an evaluator for various school systems and publishing companies.