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ABSTRACT

Schools face significant challenges in implementing computing technology within their curriculum. When technology support falters, the integrity of a school district's entire technology program is at risk. Teachers who have invested time to develop lesson plans using technology, especially those who are still newcomers, are less likely to continue to invest their energies if they cannot count on their computers to be up and running. When parents ask their children how computers are used in the classroom, or when parents visit the classroom, they may discern little or no technology use. These lapses may diminish the community support that is necessary for continuation or expansion of the district's technology program. The purpose of this article is to describe how Student Technology Assistant (STA) programs can help schools, in particular rural school districts, solve some of these problems. One danger in implementing a STAA program is that the educational needs of the students may become lost in the shuffle of administering the program. Before turning to specific programs, this paper examines this danger more closely. Then, a definition of a successful STA program is given. First steps in establishing such a program are discussed, operational considerations are identified, and finally, six successful models are examined. (Contains 26 references.) (AEF)

Student Technology Assistant Programs

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Introduction

Schools face significant challenges in implementing computing technology within their curriculum. Federal funding programs such as e-Rate are helping schools surmount the first obstacle -- initial technology purchases. According to a recent article in *Electronic School*, the average school district now has 800 computers, or one for every 4.9 students (Kongshem, 2001). The National Center for Education Statistics reports that 98% of public schools are now connected to the Internet (Cattagni, 2001), and while this does not always mean individual classroom connections, it is nonetheless one of several strong indicators of the prevalence on technology in schools.. However, still remaining as formidable obstacles are the costs of maintaining this technology and providing training for its effective use. As Kongshem's *Electronic School* article points out, computers are no longer concentrated in computer labs. Increasingly, they are located in classrooms where technical support staff may have difficulty providing adequate support. Teachers are fast developing skills and strategies for integrating these classroom computers into the curriculum. As technology becomes a more powerful tool for delivering the curriculum, teachers are relying more and more on quick and reliable repair of their classroom computers.

In the business world, one full-time person has responsibility for maintaining 50-75 computers (Consortium for School Networking, 1999). In contrast, most school districts tend to provide one support person for every 500 computers. Typically in the business world one computer is used by a single user. But in the classroom, computers serve the needs, and suffer the abuses, of many users. It is no wonder that sometimes technology support in the schools falters.

And when technology support falters, the integrity of a school district's entire technology program is at risk. Teachers who have invested time to develop lesson plans using technology, especially those who are still newcomers, are less likely to continue to invest their energies if they cannot count on their computers to be up and running. When parents ask their children how computers are used in the classroom, or when parents visit the classroom, they may discern little or no technology use. These lapses may diminish the community support that is necessary for continuation or expansion of the district's technology program.

The purpose of this article is to describe how Student Technology Assistant (STA) programs can help schools, in particular rural school districts, solve some of these problems. Small rural school districts are less likely than large urban school districts to be able to purchase and implement the technology management solutions recommended for these new decentralized networks of computers. Instead, rural school districts like Plymouth (Wisconsin) School District are turning to creative programs where students help do the work: "It's not a formal program, but we recruit kids when they hang around and when we know they're interested. If a kid puts in a full class worth of time, we'll pay around five or six dollars an hour" (Kongshem, 2001). Sedgwick (Kansas) School District for several years has selected five top Computer Tech students to serve as Tech Apprentices, offering the students an elective credit for their participation. In an interview with HPR*TEC's *KidSpeak* webzine, one Tech Apprentice noted, "If they just come in and hire a bunch of people, the people they hire don't go to school here everyday. They don't know the teachers. With students doing it... the teachers know us" (Brown, 2000). While the Plymouth and Sedgwick programs are fairly informal, many of the STA programs highlighted here are quite formal. All of them work by providing students with opportunities to gain credit for technical experience, at the same time providing technical and sometimes instructional or community-related services to others. In exchange for providing these experiences, the schools receive technical support, training for their teachers, and good communication with and support from the community for their efforts. The increased visibility and "buy-in" also give a boost to the adoption and diffusion of technology throughout the school.

One danger in implementing an STA program is that the educational needs of the students may become lost in the shuffle of administering the program. Before turning to specific programs, we'll examine this danger more closely. Then we'll define a successful STA program, discuss first steps in establishing such a program, point out a few operational considerations, and finally take a look at six successful models.

Education First

At home, more and more school-aged children are gaining access to computers and the Internet. By August 2000, the percentage of homes with computers had risen to more than 50%. Household Internet access has also increased dramatically (NTIA, 2000). There is little doubt that computer access is becoming less of a problem while our students are coming into the classroom with more technical know-how each year.

Some headlines have called attention to the potential exploitation of these technology-savvy students as technology workers in their schools. Jamieson McKenzie, editor of the online education technology journal *From Now On*, draws similarities between some computer helpdesk tasks and mowing the school lawn or washing cafeteria dishes. "It's exploiting children," he says, "There are lots of jobs that need to be done, but we expect adults to do them" (Vail, 1999).

Similarly, some are concerned that students may have inappropriate access to data. A *Los Angeles Times* article reported that in 1997 members of a local California School Educators Association chapter filed a complaint with the Irvine School District because students had unsupervised access to "the most sensitive material we store: grades, personnel records, attendance, personal e-mail" (Huffstutter, 1998).

Advocates of STA programs note that several of the larger STA programs include carefully designed curricula that address ISTE's National Educational Technology Standards. Other programs incorporate coursework that leads to A+, Cisco, Microsoft, or Novell certification. Advocates stress that students should not be penalized for their technical knowledge. In the words of Dennis Harper, the director of Generation YES, "Schools must stop operating like factories, and start to work like modern companies. The kids are the ones in power because they have the knowledge. And if you can't trust your kids, you're in trouble" (Huffstutter, 1998). Michael Milone of *Technology and Learning Magazine* praises one STA program, SWAT, for its encouragement of students as stakeholders: "Students who participate in SWAT gain a sense that they are active participants in the education process and recognize that their contributions are valued, thus they develop a stronger sense of ownership of the process" (http://www.iit.edu/~swat/overview.html).

Perhaps the most often mentioned advantage of STA programs is that they give students marketable skills and real-world problem-solving experience. In the January 2001 cover story of *Electronic School*, "The New Networkers: The Path to Hot IT Jobs Begins in High School," Kevin Bushweller notes that according to recent industry projections "about 1.6 million new IT workers will be needed this year, but hiring managers predict that about 850,000 positions probably won't be filled by appropriately skilled workers."

To keep your program aligned with your school's educational goals, you may want to keep in mind the advice offered by Kathleen Vail in her article "Kids at Work: The Pros and Cons of Using Students as Technology Workers" (1999):

- Make sure the community knows what you're doing.
- Make sure the program has an educational element.
    - Offer class or internship credits
    - Allow students to work only during scheduled times
    - Balance a technology apprenticeship with apprenticeships in other careers
- Make sure the students are supervised and mentored.
- Keep the pressure off.
- Keep an eye on security.

What are STA Programs?

Students have helped maintain computers since computers first entered schools in the 1970s. However, the start of formal large-scale STA programs can be traced to 1989 when Mike Bookey, a parent of a middle-school student in Issaquah (Washington) School District, agreed to help his daughter's school with a computer problem. Issaquah is home to many families who work for Microsoft and other high-tech companies. Yet the schools were, according to Bookey, like "a tribe cut off from the outside world for so long that they didn't know about telephones, voice mail, computers, e-mail, television, Internet and other tools of the information age" (http://www.svi.org/connect96/Profiles/Issaquah.htm). With the help of concerned educators, the support of taxpayers, and the volunteer time of many high-tech community members, Bookey started the TIP program (Technology Information Project). At Liberty High School in Issaquah, a small group of TIP students began meeting after school to learn about different network operating systems and to build prototype networks. TIP students and other volunteers did the "heavy work" of installing and troubleshooting equipment within the school district. A formal curriculum based on the TIP students' experience and modeled after similar corporate programs was put into

place in Issaquah in 1992 (http://www.Issaquah.wednet.edu/district/technology.htm). Issaquah's TIP program has since been replicated in other Washington districts, and many of the later STA programs drew inspiration from presentations which Issaquah students made around the country in the 1990s and through well-attended "open houses." TIP students worked as consultants for the State of Kentucky Department of Education in planning Kentucky's first STA conference in February 1995.

Issaquah, the community, is unlike most U.S. communities in its concentration of high-tech expertise and its taxpayer support of technology initiatives. In most of the programs discussed in this article, leadership for STA programs did not come from community members but instead from educators, and in some cases from the students themselves. For this article we've selected a range of programs, each with its own areas of emphasis. But in all of the cases discussed here, student technology assistants (STAs) are K-12 students who, under the leadership of their school, provide technological assistance to others. Usually, the assistance provided by such students is focused on instructional, technical or community-related activities. Students in such programs learn technology-related skills while providing a service to others. The work of STAs is often hailed as being beneficial for all involved.

Starting an STA Program

Given the relatively inexpensive start-up and maintenance costs of an STA program, many schools are looking to start their own program. The logical question, then, is how to proceed. The following sections detail some ideas for starting your own STA.

Determining What Kind of STA Program You Want

The first step is to determine what kind of STA program you want. The Educators' Technology Center of Indiana suggests that you begin by asking yourself who needs help and what kind of help are needed (http://etc.iupui.edu/pyop.html). Will your program focus solely on providing technical support to teachers and instructional computer equipment? This is one of the most common and cost-effective models for an STA program.

However, STA programs that address technical issues AND professional development can promote technology integration throughout the school and sometimes even save professional development costs. Such programs, however, require additional management and resources including, respectively, a coordinator for the program and monetary support from the school, district, and/or state. Such programs also do little to promote community awareness. Thus extra effort may be needed to publicize the good work the school is doing.

STA programs that combine all three types of service -- technical service, professional development, and community projects -- are generally the most beneficial (see Figure 1 for examples of the three types of service). The downside, of course, is that these programs require a significant commitment of resources in terms of management and coordination. Somebody has to serve as liaison to the community, evaluate possible projects, assign people to projects, monitor progress, and provide publicity in addition to generating the technical and professional development projects done in-house. There is no reason a school cannot begin with one type of program and expand as the school's needs and resources grow.

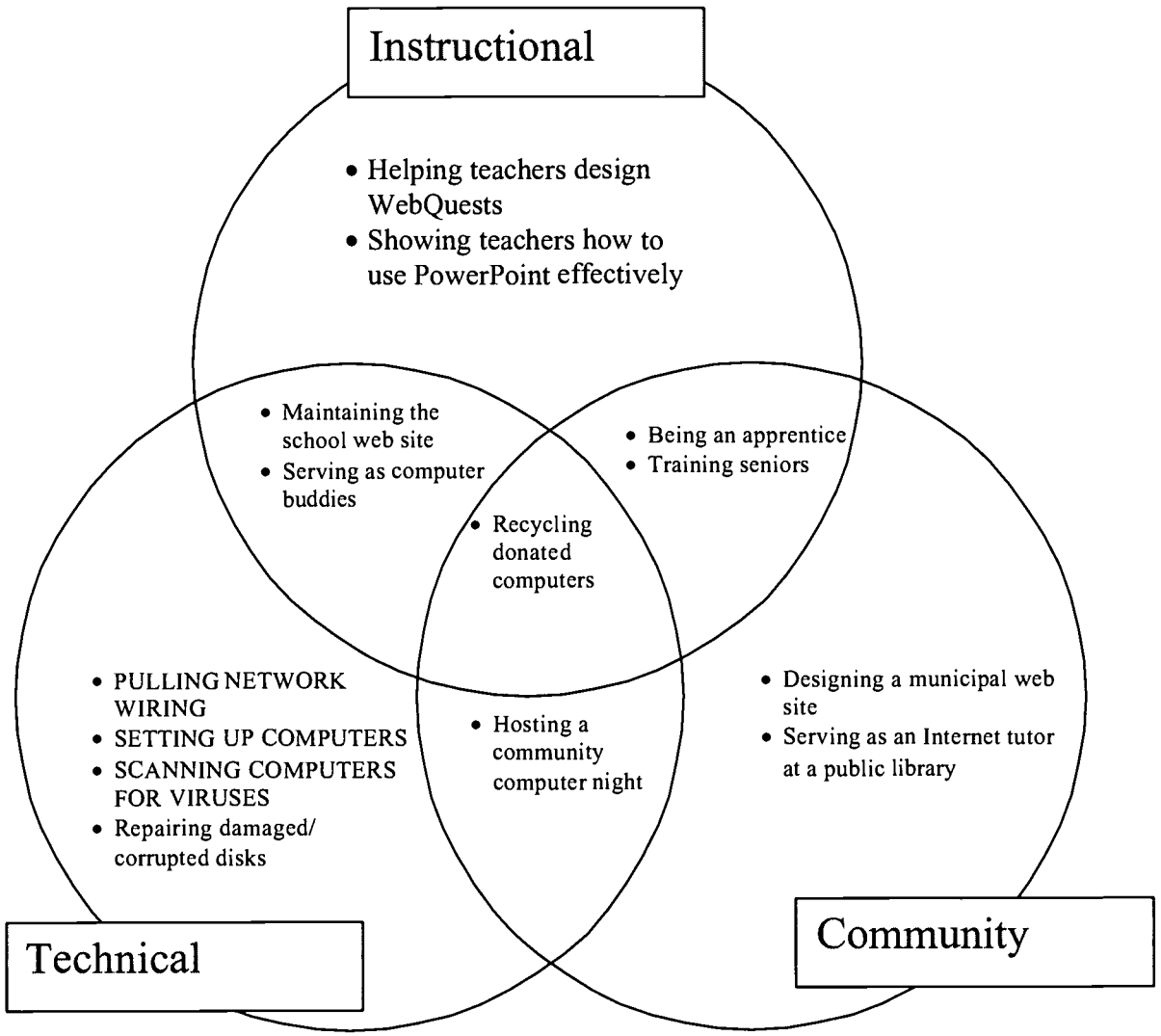

Figure 1. Three types of service provided by STAs.

Analyzing Existing Resources

Once you have decided what kind of program you want to have, you need to examine what resources are currently available. You may want to gather some data through surveys and analysis of repair times and costs. However, it is important to remember that costs are not just measured in dollars; they are also measured in attitudes and use of technology, so include items about perceptions and use. Additional questions to answer about your school include:

1. Who provides technical support now?
2. Are the support goals being met?
3. What kinds of hardware and software do you have now?
4. What kinds of resources or programs are available at other schools in your area?
5. Are there ways to pool resources with other schools?

Talk to local businesses about your program; see if they may be willing to support it with initial donations of equipment, money, or staff. Are there employers in your area who have expressed an interest in helping prepare students for technology-related jobs? You may have to limit the program scope initially and focus on some high-

impact projects that will help sell the program to your teachers and to the community. In exchange, this may aid you in finding additional resources that you can then use to take on additional projects.

An STA program is not likely to be successful in the long run if its coordination is simply piled on someone who is already overworked. Whom will you get to coordinate the program? What will that person have to give up in order to do it? Who will pick up the slack? Are there parents or community members who can help? Perhaps in the initial year of the program, the school will need to provide a substitute teacher for one class to allow the coordinator to develop the program.

Make sure the people involved are dedicated to the idea of the program. Kentucky's statewide STA program, SLTP, emphasizes that coordinators must be prepared to serve as communicators, facilitators/mentors, and also managers. The state STLP web site (http://www.kde.state.ky.us/oet/customer/stlp/coor.asp) urges the selection of coordinators who possess the following characteristics:

- Knowledgeable and enthusiastic about technology
- Energetic in pursuing student participation
- Patient in pursuit of accomplishments
- Dedicated to the success for all students and the program
- A leader with excellent organizational skills
- Willing and able to solicit the support of administrators, peers, parents, students, professionals, and community organizations
- Adaptive, innovative, and reliable in fulfilling duties

Initial Planning

There are other questions that merit early consideration. A partial list is offered by the Educators' Technology Center of Indiana:

- How will students be selected/recruited?
- What kinds of help will teachers/technicians be comfortable with?
- What age students will be involved?
- How will students be trained?
- What responsibilities will students have? Who will they report to?
- Will students be paid? Given credit? Otherwise recognized? (http://etc.iupui.edu/pyop.html)

Erica Peto, Esther Onishi, and Barbara Irish have published a handbook *Tech Team: Student Technology Assistants in the Elementary & Middle Schools* (1997), which is available from Amazon.com (http://www.amazon.com) and from the publisher's web site (http://www.linworth.com). The book, which is based on Peto's masters thesis describing the program in use at her Kent (Washington) elementary school, outlines how to publicize, organize, and manage an STA program. It provides lesson plans, sample forms, and strategies. On her school web site (http://www.kent.wednet.edu/staff/epeto/tech_team/), Peto offers ClarisWorks versions of many of the forms in use at her school as well as early drafts of lesson plans and memos included in the book. Particularly useful are her suggestions regarding the selection process of student participants. She describes the many purposes of the interview and written application question:

- To determine the strengths of the student in the area of technology
- To determine the areas in which the student may need more instruction
- To determine the extent of experience the student has in technology
- To determine the ability the student has in working with adults and other students
- To determine the perception the student has as to what is expected of him/her as a Tech Team member
- To determine if the student has given some thought as to how this activity will fit into his/her overall schedule
- To determine the ability of the student to communicate orally and in writing
- To begin to build rapport with prospective Tech Team members

Similarly Lucy Miller, founder of the SWAT approach which is used heavily in North Carolina and elsewhere around the world, is preparing a manual and CD-ROM which will be available for purchase through the SWAT website (http://www.swatweb.net/). Miller encourages e-mail inquiries (lmiller1@nc.rr.com) regarding her fee schedule. Early versions of many of her forms were previously available on the SWAT website, including one form which contained a detailed and explicit parental approval section, "I understand that my child may leave their assigned classes for short periods of time, with teacher permission, to assist other teachers and students with

computer related activities. These activities align with the state and local student technology competencies. Membership on the SWAT Team is an enrichment activity and will be monitored by..." (http://prometheus.educ.ncat.edu/users/swat/application.htm). Miller stresses the importance of gaining parental approval in the first stages of the student's application process.

Another helpful checklist of initial considerations is offered by Kristin Kuntz on the Intel in Education web site (http://www.intel.com/education/teachtech/classroom/tech_teams.htm).

Measuring Success

Regardless of the type or scope of STA program you decide to implement, there are several factors that are considered key to success. This section outlines some of these factors in more detail.

Open Participation

One of the false assumptions held about STA programs is that they require a highly skilled student base, and that they are, therefore, comprised of an elite corps of students. In actuality, STA programs are most successful when they are open to all students, even those with poorly developed technology skills. When students participate in an STA program, they are likely to learn from each other and from the training they receive as part of the STA program. There is often a snowball effect created once a majority of the students are sufficiently competent. Students who enter the program later are trained faster and often "invisibly" by their peers.

Successful STA programs set specific goals to include students who would not traditionally participate in such activities. Specifically, females, those without computers at home, and those who are academically less successful should be encouraged to participate. It is important to realize that girls tend to shy away from technology around the same time boys begin playing computer games. Too often these behaviors lead to a technology gap in high school that is never closed. Involvement in an STA program may address the long-term goal of promoting technology skills for girls. Similarly, students without computers at home often do not develop good technology skills. Including such students in an STA program can often help close the digital divide we read about every day. STA participants who are at-risk academically may develop more positive attitudes towards school and begin to view themselves as valuable members of the community.

Clearly Identified Mission, Goals, & Objectives

When starting an STA program, you need to be very clear about the mission, goals, and objectives for your program. The mission and goals guide how you will develop your program. They help you communicate to the community and other potential sources of funding exactly how you have been successful and what you intend to do with any donated equipment, time, or funds. They also ensure that, when asked, individual members of the program give consistent and accurate descriptions of the program to those who may question what the value or purpose of the STA is for the participants.

External Motivation

While the intrinsic motivation provided by STA programs can be high, some schools offer external motivation in the form of an hourly wage, typically in the range of $5 or $6 an hour. Another possibility is to offer scholarships or awards such as the two BellSouth STLP Scholarships given each year to seniors who have excelled in one of Kentucky's STLP programs (http://162.114.158.30/scholar/new.htm). The STLP annual conference for students provides students the opportunity to travel and to be recognized for their work. The STLP model also provides external motivation for schools and school districts in the form of Diamond, Gold, and Silver recognition. Recognition of community participants can also help boost community involvement.

Training & Support

While some students and teachers who want to participate in your STA program may have skills, not all will. And someone who has technical know-how may not know how to apply those skills within the context of your STA program. Regular training for current and new STAs is required for the long-term success of a program. In addition, those who coordinate the program must get the support and time they need to manage the program effectively.

Organized and Effective Collaboration

Your STA program needs to have a visible presence and contact person in the community. Interested individuals need to have easy access to program leaders in order to propose ideas or volunteer services. Students will grow through exposure to your community's multiple points of view and cultures. Again, this can't be done easily by a teacher or staff member who is coordinating the program in addition to other duties. It is probably best accomplished by the involvement of several community and business members who serve as leaders in the program.

Six Successful STA Programs

Table 1 provides six examples of STA programs in place in K-12 schools today, along with a brief description of their areas of focus. This is followed by a more in-depth analysis of these programs and their components.

Table 1 Profiles of Six Student Technology Assistant Programs

Program	Type of program	What it does/more information
Issaquah School District Technology Information Project (TIP)	Primarily Technical	Probably the first formal STA program, TIP is offered as a middle school and high school course that includes work toward technical certification. http://www.issaquah.wednet.edu/district/tip.htm
Students Recycling Used Technology (StRUT)	Primarily Technical	Founded by Intel and the Northwest Regional Education Service District, StRUT became a statewide Oregon program in 1997-98. StRUT students evaluate, repair and refurbish donated computers and in turn donate those computers to local schools. The program has been replicated in other states. http://www.strut.org
Generation Yes	Primarily Instructional	An outgrowth of Olympia (Washington) Network Navigators clubs, this program has received federal funding and recognition. Its curriculum teaches students the technology, presentation, and mentoring/teaching skills that they then use to help teachers integrate technology into their classrooms. It has recently expanded to include three additional curricula – one focused on community projects, one focused on network maintenance, and one addressing issues of students who "don't like computers." http://www.genyes.org
Kentucky Student Technology Leadership Program (STLP)	Technical, Instructional, and Community-Related	This well-organized program is administered on the state level and promoted in districts and schools across the state. Each year students participate in a statewide conference. http://www.kde.state.ky.us/oet/customer/stlp
Students Working to Advance Technology (SWAT)	Technical, Instructional, and Community-Related	SWAT is a network of schools that embrace the organization model developed by Lucy Miller in which students are assigned to task forces. Many SWAT schools are in North Carolina where students participate in a free statewide summer program. http://www.swatweb.net
Tech Team	Technical, Instructional, and Community-Related	This program's details have been well-documented by its founder Erica Peto and two classroom teachers who are active in the program. Documentation is geared toward elementary and middle schools. http://www.kent.wednet.edu/staff/epeto/tech_team/

Issaquah School District Technology Information Program (TIP)

The Technology Information Project (TIP) varies in its implementation from school to school within the Issaquah School District (http://www.issaquah.wednet.edu/district/tip.htm). However, in general all of the TIP programs follow an apprenticeship model of training. One former TIP coordinator, quoted in a Microsoft in Education case study (http://www.microsoft.com/education/planning/implement/system_issaquah.asp), described his motto: "Every computer here is equipped with a teenager."

At the middle school level, all students are welcome regardless of their prior experience with technology. Students pledge to teach each other. At the high school level, students are expected to bring prior experience and skills. They are carefully screened during an application process that includes an ethics test and a teacher recommendation. Students accepted into the program receive course credit. In some cases, basic skills are taught not only through authentic learning assignments but also through a certification preparation program. In addition to these basic skills, TIP programs stress "an appetite for life-long learning and goal-setting" (http://www.ims.Issaquah.wednet.edu/isdtip.htm).

Sample TIP projects include the following:

- Provide afternoon access to the school computer lab and library computer facilities
- Provide technical support for feeder schools and community centers
- Maintain the school's user network and mail accounts
- Help monitor security and space issues on the school's network
- Maintain and install all network wiring for the school
- Provide routine maintenance and technical support for the school
- Help train staff and students on the use of the school's computer workstations

The student-maintained TIP page for Liberty High School describes the philosophy of that school's program and its emphasis on public presentation of student work (http://www.liberty.issaquah.webnet.edu/TiPpage/philosophy.htm): "Imagine how it feels for a sixteen year old to get up in front of a group of 'suits' some 300 strong and actually have them TAKING NOTES as you speak."

The following individual schools maintain TIP web sites:

- Issaquah Middle School
  - http://www.ims.issaquah.wednet.edu/isdtip.htm
- Issaquah High School
  - http://www.ihs.issaquah.wednet.edu/ihstip/
- Liberty High School
  - http://www.liberty.issaquah.webnet.edu/TiPpage/

Students Recycling Used Technology (StRUT)

Another technology-focused STA program, StRUT, was co-founded by Intel and the Northwest Regional Education Service District in Oregon in 1995 (http://www.strut.org). The program was designed to refurbish and make use of donated computer equipment. Specifically, the goals of the program are as follows:

1. To develop programs where students gain valuable technical and business management skills by assembling, testing and loading software on donated computers.
2. To place these computers in schools throughout the area to supplement those purchased by the district.
3. To work with business partners to reduce the barriers preventing schools from accessing the Internet and other communication technologies.

StRUT has expanded to each of the 21 districts in Oregon. To date, more than 1,000 students have been involved in the StRUT program, and these students have refurbished over 15,000 computers and donated them to more than 70 schools. In 1999, StRUT received Oregon's SOLV Citizenship Award.

Most StRUT programs are run as after school clubs that emphasize field trips and rigorous participation in certification programs such as A+ and Cisco. Some StRUT programs have joined forces with Cisco Networking Academy to enhance this training. One such program is West Albany High School's Computer Networking Program. Its coordinator Dave Hudson is a 1999 recipient of the Oregon Innovators in Education Award. His report on the program is available online (http://www.osba.org/salute/2000/sal0002.htm).

The StRUT alliance, as an example of a technical STA program, has proven to be so successful that it has expanded beyond Oregon's boundaries. StRUT is being implemented in six other states -- Arizona

(http://www.azstrut.org/), California, Georgia (http://www.sandersvilletech.org/gastrut/), Massachusetts, New Mexico, and Texas (http://www.txstrut.org/).

The following individual Oregon schools are among those maintaining StRUT web sites:

- Sam Barlow High School
  - http://www.gresham.k12.or.us/strut/default.html
- Spray High School
  - http://www.spray.k12.or.us/strut/strut.htm
- Nestucca High School
  - http://www.nestucca.k12.or.us/strut.htm

Generation YES

Generation YES (Youth and Educators Succeeding), a third STA program with roots in the Pacific Northwest, initially focused exclusively on instructional issues (http://www.genyes.org). Even now, the primary curriculum offered by Generation YES (variously called Gen YES, Gen Y, and Gen www.Y) is a training program that prepares students in grades 3 through 12 to serve as mentors to teachers who are integrating technology into their classroom teaching. Graduates of this semester-long program can now continue with the Gen DID curriculum (which focuses on a major community project). Students who demonstrate maturity and technical skills may enroll in the Generation SCI curriculum (Students Caring for Infrastructure, which focuses on computer network maintenance). A fourth curriculum, Gen GIT (Girls' Issues and Technology), is designed to meet the needs of girls who "don't like computers." The more than 500 schools in 41 states affiliated with Generation YES now constitute probably the most widespread STA network in the country.

An outgrowth of the Olympia School District's Network Navigator mentoring program, Generation YES received a federal Technology Innovation Challenge Grant in 1996. Dennis Harper, author of this initial grant, still serves as executive director for Gen Yes, which is now administered by the Office of Educational Research and Improvement (OERI). The Generation YES curriculum kits, which are aligned with the International Society for Technology in Education (ISTE) National Educational Technology Standards, are available for purchase through the ISTE bookstore (http://www.iste.org/Bookstore/index.html). The ISTE magazine *Learning and Leading with Technology* profiled Generation YES in October 1999 (http://www.iste.org/L&L/archive/vol27/no2/features/harper/index.html) and regularly features the writing of Gen YES students in its "Student Voices" column. In 2000, the U.S. Department of Education's Educational Technology Expert Panel recognized Gen YES as one of only two "Exemplary Programs" (http://www.ed.gov/offices/OERI/ORAD/LTD/newtech_progs.html). Most recently, *USA Today* highlighted the program in an August 8, 2001, back-to-school article (http://www.usatoday.com/life/cyber/tech/2001-08-06-students-tutor-teachers.htm).

Students who participate in the basic program enroll in a semester-long (18-week) course to learn necessary technical skills and integration techniques to help their teachers with technology-related lesson planning. The program does not require students to have prerequisite technology skills, but the challenging nature of the curriculum does require significant student effort. Each student is paired with a teacher to assist with a lesson or project's technology integration.

In one such project for a social studies class, an STA helped a teacher develop a unit on Graham County history that made use of a scanner, digital video camera, Avid Cinema editing software, and Photo Deluxe image editing software. The teacher and the STA filmed different historical sites around the county using a digital video camera. Students in the teacher's class meanwhile collected pictures of Graham County that were then scanned in and combined with the video, which was edited to include music. The video was then shown to the class as part of the unit on the history of Graham County, and students were tested on the content.

Another project developed for a science class took a chapter from the class textbook and created storyboards for the chapter. These storyboards called for pictures and images for illustration, which were gathered from the Internet, the textbook, and other print resources. Images were scanned as necessary and, combined with the storyboards, were then used to create PowerPoint slides. The teacher presented the unit to the class.

In a third project, for an English/Language Arts class, an STA worked with the teacher to teach students how to use a digital camera to take pictures and how to edit those pictures in an image editing program. As a practice assessment, the teacher and students went on a scavenger hunt, taking pictures of specific objects and then editing them. The teacher and the STA developed "story starters" which the students then elaborated, continuing the stories and illustrating them with digital photos. More projects and information can be found at http://www.genyes.org/genwwwy/.

Below are just some of the web sites of participating Gen Yes schools:

- Argyle Central School (Argyle, New York)
  - http://www.nheeep.org/SchoolWebs/argyleweb/Programs/GenY.htm
- Birmingham High School (Los Angeles, California)
  - http://www.lausd.k12.ca.us/Birmingham_Magnet_HS/GENYWEB/
- Thurgood Marshall Middle School (Olympia, Washington)
  - http://kids.osd.wednet.edu/Marshall/homepage/thurgoodmarshall.html

Kentucky Student Technology Leadership Program (STLP)

Kentucky's Student Technology Leadership Program (STLP) exemplifies a state-organized STA program (http://www.kde.state.ky.us/oet/customer/stlp). According to its web site, 828 Kentucky schools in 165 Kentucky school districts currently participate. Although at first glance its vastness and organizational complexity may seem intimidating, many of STLP's features are noteworthy even for rural schools who are considering implementing a small-scale STA program. Specifically, Kentucky's program involves students in technical, instructional, and community-related projects, making its usefulness broader than one specific area. Additionally, the program provides local districts with state-level guidance, a feature that helps insure that proper instructional objectives and standards are being met. The state-organized nature of the program allows for more uniform development and collaboration across the state. State-run competitions and student conferences assure that students work hard to maintain a high quality of work.

Kentucky's STAs have performed a number of technical-related tasks. Specifically, they have created and maintained web pages, wired classrooms and laboratories, produced videos, and assisted faculty members with technology-related problems. These projects are varied and numerous and go beyond simple technical troubleshooting.

The instructional projects of Kentucky's program are also broad and diverse. Students have developed brochures, mentored younger students, developed electronic portfolios, evaluated software, and provided technical instruction. One STA school developed a PowerPoint presentation on the state of Kentucky using graphics and sounds of the state bird and the state song. Another STA school implemented electronic portfolios of HyperStudio work, studied and reported on technology related issues such as Y2K, developed web-based curriculum, illustrated poems with digital pictures, built WebQuests for several topics, created audio/video broadcast coverage for campaigns and a shuttle launch, and generated a variety of print-based materials such as news letters and newspapers. In another school, students reviewed software programs and then held a showcase to introduce the software to teachers. Another project enlisted STAs in helping parents learn how to use the Internet during weekly "Internet night" workshops. STAs in yet another program developed a program called "Technology Opportunities in the Library." Teachers attending this program learned how to use a digital camera, a scanner, HyperStudio, and a Laserdisc player. Ideas for integrating these technologies into classroom curriculum were also presented. There are also scores of instances where STAs have helped teachers and community members learn to use programs like Excel, Powerpoint, and Hyperstudio; to troubleshoot and maintain classroom computers; and to use a variety of hardware.

STLP has generated hundreds of community projects. Students in this program have helped maintain city web sites and build and maintain web sites for community organizations and schools. They have converted networking systems and installed computers for neighboring schools, conducted research and web page maintenance for local companies, and taught community education classes in PowerPoint and other software applications. They have made holiday cards and large-print phonebooks. They have held workshops for senior citizens in assisted-living facilities, managed and supported a lending library for software and hardware open to the community, and created business cards and pamphlets for local organizations.

Providing technical, instructional, and community-related assistance to others follows the mission of Kentucky's Student Technology Leadership Program. The STLP mission aims to advance the individual capabilities of all students, to motivate all students, and to create leadership opportunities through the use of technology. The specific goals of this mission are as follows:

- The STLP will develop activities that enhance the academic, social and emotional growth of the student.
- The STLP will provide leadership opportunities for all students.
- The STLP will experience multi-age collaboration by forming innovative learning partnerships.
- The STLP will form learning partnerships between students with different technology skills.

- The STLP will develop activities that benefit communities.
- The STLP will develop instructional activities which integrates technology and benefits the school and support KETS (Kentucky Education Technology System)

From its inception, these six goals have guided STLP. In her 1999 *Learning and Leading with Technology* article, Elaine Harrison describes the advisory council that formulated these goals and structured the program in its early days. She notes, "The Kentucky Department of Education gave grants ($1,000 per year) to the initial STLP schools for the 1994–95 and 1995–96 school years." Online manual materials describe the program's structure – an adult STLP coordinator for the school and student cluster coordinators for individual projects – and the process followed to create a unified action plan that meets the program's six goals.

One notable aspect of Kentucky's program is its inclusiveness. The program strives to include a population fully representing the school's diversity. This means that the program aims to draw females, minorities, and special education students. Activities are scheduled with a flexibility that assures that no student is excluded on the basis of schedule. As a means of assuring inclusiveness, the STLP program stresses four important roles for students involved in the program – starter, liaison, trainer, and provider.

Below is a sampling of individual STLP web sites:

- Charles Russell Elementary School
  - http://crussell.ashland.k12.ky.us/stlp\stlp.htm
- Paul Lawrence Dunbar High School
  - http://www.pldhs.com/stlp.html
- Region 6
  - http://www.k12.ky.us/oapd/rsc6/stlp.asp

SWAT – Students Working to Advance Technology

Another nationally recognized STA program, SWAT, focuses its efforts on student leadership training, technology integration, and community outreach. Although the program has been implemented across the nation, individual programs are expected to each have their own personality. SWAT teams, as many implemented programs have been called, are supported by guidelines (http://www.fetc.org/fetcon/1199/swat.html), yet each of the programs are expected to assess the technological needs of their local school and community.

Students who are interested in participating in a SWAT program are usually required to complete a job application and complete an interview. In this way, teachers can more appropriately evaluate the types of programs to embrace, and perhaps more importantly, to effectively match students with technology tasks.

After assessing the technology needs of the local school and community, those who are implementing the SWAT program are encouraged to do the following:

- Communicate concerns with administrators, teachers, and the community
- Develop a program mission, with goals, priorities, a plan of action, and a method of evaluation
- Announce the plan to the students
- Distribute applications and obtain parental permission
- Conduct interview to build SWAT teams
- Assess the technology needs of the local school and community
- Train the students
- Monitor and evaluate the program

Task Force Teams, the organizational name given to a job that a student is assigned to complete, can include any number of responsibilities. Examples of these teams include the following: TV/Weather Internet Crew, Internet Researcher, Web Master, and Computer Buddy. Of course, the possibilities are limitless for teams and responsibilities. But again, local needs should drive the development of teams.

During summer 2001, the second annual SWAT Camp was offered to North Carolina's SWAT students at seven CyberCampuses <http://www.dlt.ncssm.edu/swat/swat_camp.cfm>. The program, which is free to students, is funded through a Technology Innovation Challenge Grant.

One web site hosted by the North Carolina School of Science and Mathematics serves as a resource for ten high school SWAT programs in North Carolina <http://www.dlt.ncssm.edu/SWAT/index.cfm>. This consortium of SWAT programs is currently planning a portfolio process by which students can become "SWAT Team certified" in web page design: "Certification implies that the student is capable of designing pages for school community members and organizations."

Below are a sampling of other school web sites affiliated with SWAT:

- Narragansett Elementary School (Narragansett, Rhode Island)
  - http://www.ri.net/schools/Narragansett/NES/SWAT/swat.html
- Eastview Elementary School (Connersville, Indiana)
  - http://fayette.k12.in.us/eastview/computerclub.html

Tech Teams

Erica Peto's model for TechTeams has been cited as an influence for a variety of programs, including the Ballard Tech Team, which is a featured School Web Clubs web site <http://supportnet.merit.edu/webclubs/featured1.html>. In a June 2000 *Education World* article, Ballard teacher Marcia Cousins explains, "As the tech people in our building, we were becoming more and more overtaxed and overwhelmed with trying to teach and also be the 'techies'... As we added more and more computers, the task increased. Hence, the idea for a tech team evolved. We had the opportunity to see a presentation on tech teams and had the resource of a book -- *Teams, Student Technology Assistants in the Elementary and Middle School*, published by Linworth Publishing [ISBN 0-938865-60-9]. This book is geared just towards a tech team and not a Web club. Ours has developed into both" <http://www.educationworld.com/a_tech/tech035.shtml>.

Similarly, Mississippi's new CREATE (Challenging Regional Educators to Advance Technology in Education, http://www.create4ms.org) program draws from Peto's model in designing student Techno Teams who provide support for the program's technology carts. Schools within the CREATE program are encouraged to gain ideas and inspirations from Peto's workbook but to create tech teams suited for their own schools.

Peto's model, as described on the web site <http://www.kent.wednet.edu/staff/epeto/tech_team>, is designed to meet the needs of her own school, Daniel Elementary, as well as other schools in the Kent School District. As she explains, "The main function of the Tech Team is to assist during media block (a combination of library and computer classes). Tech Team members also help during preschool and Head Start preschool computer center time."

Tech Team members at Daniel are fourth, fifth and sixth grade students who volunteer to miss approximately one hour of class time per week and make up that work on their own: "During this time, they assist students who are learning to use technology and working on technology-related projects. In addition, Tech Team students agree to attend a training session once per week. Last year this training time was held after school but this year it is held during lunch recess."

The school's web site <http://www.kent.wednet.edu/KSD/DE/st_proj/st_proj.html> offers a glimpse of a variety of impressive student projects supported by Daniel's Tech Team members.

Conclusion

As these models demonstrate, STA programs can be an excellent way for schools to promote technology integration, for teachers and students to gain technology skills, for students to become more involved and committed to their communities, and for communities to gain services they could not otherwise get and a more educated workforce. In most cases, the start-up costs are small.

Before embracing one of these models or creating your own, you should first explore what is being done in other schools in your state. Have several schools within your state adopted the Gen Yes curriculum? Does StRUT operate in your state? Is there a large employer in your state interested in helping coordinate a StRUT-like program? Is your State Department of Education considering a statewide initiative such as Kentucky's? Perhaps your state can achieve the synergy Mississippi schools achieved when they applied for and acquired federal funding for the CREATE project.

The key to any successful program must be that it meets the needs of your school and your students. And though STA programs have proven helpful in addressing schools' budgetary crises, no STA program should be viewed as a permanent replacement for budgeted technical support dollars. For the full potential of STA programs to be achieved – technical, instructional, and community – the focus must firmly centered on students' academic needs.

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