Chapter IV: Solution Strategy

Discussion and Evaluation of Solutions

Numerous solutions have been suggested in the literature to assist students and teachers in seamlessly infusing the available technology into the curriculum. These solutions offered tend to fall in the following categories: (a) ways to dispel technophobia; (b) careful planning of appropriate teacher training conducted by peers in small group sessions; (c) ongoing training and support; (d) easy accessibility of the technology; (e) allotment of time for teachers to learn and share with their peers; (f) training for students and opportunities for them to use the technology, keeping in mind their different learning modalities; and (g) enabling administrators to become proficient technology users so they can become visionary leaders in technology.

Ways to dissipate technophobia induced by gender and age factors has been documented in the literature. Brunner (1997) suggested that trainers should emphasize that the computer can be looked at as another means of communication, comparing it simply to a telephone or the post office system. Rosen and Weil (1995) stressed that the facilitator of workshops must ensure a comfortable, relaxed, non-threatening atmosphere. In 1993, Ringstaff and Yocum (1993) wrote that a constructivist learning environment providing hands-on experiences should be established for training workshops in which teachers are allowed to choose to work in teams or individually.
Appropriate training for teachers that is carefully planned so multiple learning styles are addressed and that is facilitated by skilled peers whom the teachers trust, can provide the knowledge and experience teachers need to feel more comfortable about using technology. Tally and Grimaldi (1995) stated, "Teachers need opportunities to talk about their experiences with other teachers struggling with the same issues, or with a facilitator who understands both curriculum and technology" (on-line). They emphasized that learning styles must be considered when planning teacher training; that approaches to staff development must be varied because any one approach will not work with all teachers due to their differences in learning styles, and because the teachers are not at the same skill level.

Other studies indicated that on-site coordinators must be skilled in effective pedagogy and instructional technology (Office of Technology, 1995). Writers such as Harrington-Lueker (1996) and Siegel (1995) stressed that training groups should be small so that teachers feel more at ease and can receive more assistance.

Ongoing support and training must be provided to staff to sustain the knowledge about technology that they have learned, so that they will continue to use the technology in their classrooms. Ongoing training after the initial training is essential to successful implementation (Fulton, 1996; Kranz, 1996; Shelton & Jones, 1996; Siegel, 1995). An on-site technology support person should be available to facilitate
the use of technologies (Office of Technology, 1995; Ringstaff & Yocom, 1993). Harrington-Lueker (1996) reviewed the National Staff Development Council's (NSDC) recommendations that suggest that before a particular teaching strategy might take hold, at least 20 follow-up sessions might be required. The Council suggested that a school system might need to designate 50% of its staff development funding to follow-up training after an initial training workshop.

Easy and continual access to technology as well as acquisition of newer and better technology is a necessity if true integration is going to occur. Stager (1995) stressed that "It should not be surprising that teachers without sufficient access to computer technology don't embrace its use" (p. 80). The Office of Technology (1995) also pointed out that teachers really learn how to use technology when they are given unlimited access to it.

Teachers learn best from each other and need the time to learn and apply the technology while commiserating and celebrating the use of technology together (Carter, 1996; Guhlin, 1997). Teachers need opportunities to observe exemplary classrooms where teachers are successfully infusing technology into the curriculum and modeling new teaching strategies (Tally & Grimaldi, 1995; Yocom, 1996). Weekly informal technology get-togethers where teachers can share student work and discuss ideas can help to encourage and motivate teachers (Shelton & Jones, 1996).
Students need to be given training in using the technology and opportunities to explore it, keeping in mind their multiple learning styles. Thornburg (1991) said it best, "We need to examine the role of technology as a tool that can help us teach to the whole child" (p. 17). Students, who are skilled technology users, can provide assistance to teachers and peers.

Ingram (1998) described the Computer Support Practicum (CSP) course for high school students in Monett, Missouri. The students are trained for 1 week in the summer to set up new equipment, maintain existing equipment, install and troubleshoot software and hardware, and perform networking installation and maintenance. The state of Kentucky initiated a similar program entitled the Student Technology Leadership Program (Holzberg, 1997). Farmer (1998) described the very successful Technical Aide (TA) internship program the Tamalpais Union High School District in Larkspur, California established. The Crestview School in suburban Winnipeg, Canada developed a student cadre program to assist their teachers and peers in using technology (Orwig, 1994). The writers attributed these student technology programs as a vital component of schools integrating technology successfully into the curriculum.

Training must also be provided for administrators so that they become proficient in technology enabling them to become visionary leaders providing a supportive environment for teachers and students to use technology (Armstrong et
al., 1996; Hawkins, 1994; Office of Technology, 1995; Spriggs & Bohannon, 1995). The same technology workshops for teachers should be available for administrators.

As the writer reviewed the literature and evaluated the solutions, many ideas were generated. Finding the time so that teachers and administrators can attend training workshops, explore technology, observe exemplary classes, and write lesson plans that integrate the technology was a priority in solving the problem. Many creative solutions were possible, however. Mini-training sessions could be conducted during teacher planning periods. Longer workshops could be held on teacher planning and early release days. Early morning, brief and informal training and sharing could be offered. The writer or teachers could provide classroom coverage for other teachers so that they could observe in other classrooms or collaborate on lessons.

It was extremely important to provide training to staff members in a relaxed, non-threatening way. The facilitators selected had to elicit confidence from the staff so that the staff would be comfortable. There was no set prescribed way for technology to be integrated into the curriculum. Teachers needed to be given examples and be shown models of how the technology could be integrated into their specific curriculum areas. Teachers needed to be allowed to formulate innovative ways to utilize technology in their classrooms specific to their curriculum areas and creative teaching styles. Students needed to be provided with opportunities to use the
technology in ways that meshed with their own learning styles.

All shareholders had to first buy into a plan that would induce change, if they were to be supportive and cooperative in carrying out the plan. They required being informed about any new program implementations, and they needed to be updated on the status of the program. They needed to become a part of the program implementation to ensure their continued support.

Using students as technology assistants could free up the writer's time, enabling students and teachers to receive timely assistance. If each team had a student who had been trained by the technology coordinator, then each teacher on a team could look to that student for immediate help. Although the student would not be able to handle all situations, he would be able to save the technology coordinator some time by troubleshooting many simpler problems.

Communication is a vital component when implementing a program. The writer herself could become a visionary leader by acting as a role model, by being enthusiastic and energetic, and most of all by being available for assistance while facilitating as an encouraging consultant.

Description of Selected Solutions

The writer was prepared to try the following ideas believing that they would work because they were all viable and in line with the highly endorsed vision and mission of the school. The writer implemented a multiple-level staff
development program called Teachers Integrating Educational Resources for Students (TIERS). The acronym TIERS is also a homonym for the tears of frustration technology sometimes induces.

One tier was the mini-session training that occurred with the teachers as teams during their planning periods once every 3 weeks (see Appendix G). Another tier consisted of training workshops the writer coordinated on early release days and several planning days. Teachers and administrators attended these by departments on a rotational schedule so that they eventually rotated through all seven workshops (see Appendix H). The writer, along with the sixth grade administrator, scheduled voluntary sessions that were held 1 hour before school began on Wednesday mornings in the media center. As part of this training tier, teachers and administrators met with the writer and other technology team members for individual assistance and training, or for sharing ideas and student work.

The writer constructed the training tiers to include the following conditions in accordance with the recommendations of numerous researchers and writers (Bulkeley, 1988; Donoho, 1994; Ringstaff and Yocum, 1993; Tally & Grimaldi, 1995; Rosen & Weil, 1995; Thornburg, 1991; Weil, 1995). Staff members, whom the teachers trusted, were selected to conduct the training sessions held on early release and planning days. The facilitators met with departments resulting in small group instruction. They provided hands-on activities
addressing many learning styles in non-threatening environments. The writer designed the workshops so that they would be ongoing and reinforcing as recommended by many professionals advocating technology training (Fulton, 1996; Hurst, 1998; Kranz, 1996; Lovely, 1997; Ritchie, 1996; Schrum, 1998; Shelton & Jones, 1996; Siegel, 1995; Sudzina, 1993).

The writer also initiated a student technology cadre called the Student Technology Expert Program (STEP). Essentially, this was another tier of the training program that had been endorsed in the literature (Becker, 1994; Holzberg, 1997; Lovely, 1997; Office of Technology, 1995; Orwig, 1994; Siegel, 1995). The students selected for STEP were recommended by their teachers (see Appendix I for nomination form) based on their knowledge of computers and evidence of good citizenship. STEP members met with the writer after school one afternoon every other week for training in the use of the hardware and software so that they could assist their teachers and peers.

Report of Action Taken

Prior to the actual practicum implementation, the writer met with administration to outline the practicum and to select agreeable dates for initiation and implementation. They were supportive and cooperative. Once the days were determined, they were entered onto the school's master calendar kept in the sixth grade administrator's office. The writer also scheduled a day to meet with the technology team.
Additionally, she selected a date for a meeting to introduce the practicum to the staff.

The writer then met with the technology team to discuss the practicum. The members reviewed the needs assessment (see Appendix A) and chose the workshops deemed most crucial. The members of the team agreed to teach a workshop every early release day and also on the scheduled planning days. They then proceeded to select the topic they felt most competent to teach. The writer emphasized that they should not only teach the skills necessary to use the application or hardware, but also, they were to stress ways in which to integrate the technology into the curriculum. Because departments were rotating through the workshops, the writer suggested that the facilitators use brainstorming techniques to elicit integration ideas from the group that would adapt to the particular department's curricular area.

Several days after the meeting with the technology team, the writer introduced the TIERS and STEP program to the staff using a PowerPoint presentation. She delineated the tiers of the TIER program and disseminated workshop schedules. The writer also explained the assessment tools and the requirements for earning inservice points for attending the early release and planning day workshops. The writer then commenced to outline the mini-session workshops scheduled on a 3-week rotation schedule during teacher planning periods.

Additionally, the writer described STEP and discussed the criteria for teachers to use in recommending students for
the program. The writer encouraged each team to recommend one student. They were to select this student based on the student's high interest in computers, respectfulness, and demonstration of responsible behavior.

The writer validated the lack of time available to teachers to learn new skills and pedagogy. Consequently, she offered to cover one of their classes commencing second quarter, enabling them to observe other classrooms or collaborate with other teachers. At the conclusion of the meeting, the writer distributed the STEP nomination forms (see Appendix I) and administered the technology attitudinal questionnaires (see Appendix E). The teachers completed the questionnaires and submitted them to the writer before leaving the meeting.

To make the time-line easier to follow, the writer will discuss the implementation of each of the different tiers.

**Mini-Sessions**

The writer held the first mini-session training with the sixth grade teachers during the first week. The writer taught the teachers the proper procedure for using the computer lab rooms. They were shown how to log onto the computers through the At Ease desktop security program, and how to toggle between the Mac and the PC processors on the dual-platform computers. Teachers brainstormed ways to use the lab as an enhancement to their curriculum. The mini-session workshop on using the computer lab room was repeated in Week 2 for the seventh grade teachers, and again in the Week 3 for the
eighth grade teachers. The writer scheduled the elective and special education teachers to attend one of these grade-level sessions during their planning periods.

During Week 4, the writer met with the sixth grade teachers during their planning periods for a mini-session on using the state's network system that allows public employees free access on the Internet and popmail privileges. The teachers brainstormed the variety of personal and classroom uses for this system. The writer demonstrated logging onto the Internet using Netscape. Teachers not already entered in this system, completed registration forms. The writer used these forms to register the teachers via the Internet in the mornings from her house when the system was least busy. She repeated this workshop for the seventh grade teachers during Month 2, Week 1 and for the eighth grade teachers during Month 2, Week 2.

During Month 2, Weeks 3 and 4, and Month 3, Week 1, a mini-session on using the state network's popmail system via Netscape was presented. The writer issued the teachers their usernames and passwords that had been assigned to them. The teachers were told to bring their laptops with them, and they configured their laptops to accept their new popmail accounts. They practiced accessing and sending e-mail via this account for the remainder of the session.

The writer conducted a mini-session on using the Internet during Month 3, Weeks 2-4. The use of various search engines and the options available in setting up preferences
were discussed and then explored. The writer had the teachers select a research topic they might want their students to research and then surf the net as if they were the students. Consequently, they experienced first hand, what the students would be required to do.

During Month 4, Week 1, and Month 5, Weeks 1 and 2, the teachers met by grade level for mini-sessions on designing a Web page using Claris Home Page. The writer explained good artistic design qualities providing guidelines to producing attractive, informative and functional Web pages. The teachers began to design their own Web pages during this time.

The mini-session for Month 5, weeks 3 and 4, and Month 6, Week 1 was on integrating technology into the curriculum. The writer suggested ways to use technology as a tool to enhance the curriculum such as (a) having students use the computer as a research tool, (b) using the computer for word processing, (c) using the LCD panel or projector to project notes, (d) communicating with subject experts via e-mail, (e) using the laser disc player to illustrate concepts and complement lessons, and (f) using multi-media software applications for student projects and presentations. A brainstorming session followed allowing the teachers to suggest other ways to use the technology and share their own experiences.

During Month 6, Weeks 2-4, the writer facilitated a workshop on using the local area and wide area networks to
access file servers to download files. The writer had planned to have file folders for every student and teacher on the school's server, but was not able to carry out the plan because numerous restrictions were placed on the use of the server to avoid possible interference or corruption of the wide area network. Consequently, the writer did not train the teachers on how to upload files. She did, however, direct them to servers at other schools to find useful applications.

The school district, with the exception of the newer schools with Windows NT servers, was using an Intranet mail program entitled Mac Mail on Macintosh servers. The writer's school had no access to Intranet mail until the sixth month of the practicum. The district's Education Technology Services (ETS) had been experimenting with using Microsoft Exchange on the wide area network, and had installed a patch program to enable the two mail programs to communicate with each other. At the end of the sixth month, ETS gave permission to the new schools to install Microsoft Exchange on their servers and to begin using it. During Weeks 1-3 of the seventh month, the writer conducted a mini-session on using the Microsoft Exchange program for Intranet e-mail.

During Month 7, Week 4, the teachers learned how to use file-sharing techniques such as local talk, the network, and infrared. The writer explored ways to take advantage of this technique such as sharing lesson plans, and installing applications available on CD-ROM onto laptops without CD-ROM drives.
During Month 8, Weeks 2 and 4, and Month 9, Week 1, the teachers selected a multi-media program and used the time to prepare an open house presentation for next year.

The last mini-session, held during Month 9, Weeks 2-4, was about using the gradebook program entitled, Grade Quick. The writer had won a raffle for a Grade Quick site license at a county convention that had been held in the eighth week of the practicum. ETS approved using it as a stand-alone program on teachers' laptops. The writer took advantage of this opportunity and introduced it to the teachers. She installed the program on their laptops so that during the summer vacation, they could experiment with it.

**Early Release**

The teachers rotated by departments through seven workshops on six early release days and one planning day. The writer had to rearrange a few of the original dates for workshops because of scheduling conflicts requiring emergency administrative meetings. The staff and administration were extremely flexible and cooperative. A staff member skilled in the particular application or hardware conducted each workshop.

The workshops were held for 1 hour and 45 minutes. The writer instructed the teachers to bring their laptops to every workshop. The facilitators instructed for 1 hour, allowing simultaneous hands-on practice, and verbal discussion. They then facilitated a brainstorming session of possible uses for the technology. The teachers used the
remainder of the time to prepare a project using the application or hardware. The teachers had 1 month following the workshops to submit to the writer a written lesson that illustrated the integration of the application software into their curricular areas. In addition, the teachers had to submit written lesson plans indicating the integration of the peripherals into their curriculum.

The **ClarisWorks** 1 workshop was held in a classroom and concentrated on the use of the word processing, draw, and slideshow components of **ClarisWorks**. The facilitator of **ClarisWorks** 2 taught the use of databases and merging applications in the media center. The facilitator presented lessons on spreadsheets and charts in the **ClarisWorks** 3 workshop held in the computer instruction room.

The two multi-media presentation applications presented to the teachers were **HyperStudio** and **PowerPoint**. The **HyperStudio** instructor conducted her workshop in the large computer lab room and concentrated on student applications of the program. The **PowerPoint** instructor conducted her workshop in a regular classroom and concentrated on teacher use of the program for open house and lesson presentations.

The writer embarrassingly discovered during the first **WebWhacker** session, that it could not be used on computers on the wide area network because of the firewall that had been installed by ETS. This workshop was held in the small computer lab. The workshop was then designated as an Internet
workshop concentrating on exploring sites appropriate to the department’s curricular area.

The teachers learned to use LCD projectors and panels, scanners, digital cameras, and laser disc players in the peripheral workshop held in the media center. Ways in which to use the peripheral to enhance instruction were demonstrated by the facilitator of the workshop.

**Egret Morning Sessions**

Morning training sessions on (a) basic laptop operation, (b) computer troubleshooting tips, (c) the integration of technology, (d) the use of zip drives (e) networking, (f) the use of specific curriculum-related software programs and (g) the use of specific laser disk applications were scheduled an hour before the staff had to report to school once a month. The writer worked closely with the sixth grade administrator in planning the topics for these workshops and offered breakfast as an incentive. Very few teachers were able or had the desire to begin their day that early. After the first 3 months, the administration cancelled the Egret sessions that were scheduled for the remainder of the year. The writer offered, as an alternative, to train teachers individually during their planning periods or after school.

**STEP Sessions**

At the beginning of Month 1, Week 3, the writer gave permission forms to the team leaders to disseminate to the students they had recommended for STEP. The team leaders informed the students that the first STEP meeting would be
held 2 weeks later. Students were also told that to be able to attend the meeting, they were required to return the signed parent permission forms to their team leaders.

During Month 2, Week 1, the writer met with the 11 STEP students after school for 1 hour. She explained the general procedures and student responsibilities. The writer emphasized the maturity level she expected them to exhibit. She stressed the importance of the responsibility because she was entrusting them with access passwords and expensive equipment.

The writer repeated the mini-session workshop that had been provided to the teachers on the proper use of the computer lab rooms. The students were given the added responsibility of knowing the *At Ease* password to enable them to fix problems on the computers if necessary.

During Month 3, students met to learn about the state’s network system so that they would be able to assist teachers in using it. The students learned how to install new applications onto the computers in the lab room. Included in this training was learning how to add new applications to the *At Ease* desktop security program.

The writer cancelled all STEP meetings in the fourth month because of the approaching holidays and the writer’s time constraints. The sessions resumed in the fifth month. The writer had intended to teach the students to access the tower in the media center via classroom computers, but the company contracted to set it up was having technical
problems. The tower was not operational for the remainder of the year so this training was cancelled. The writer taught the students how to patch wires in the hubs and the classroom. She also demonstrated network-troubleshooting techniques. In the second session during the fifth month, the students learned to use Claris Home Page to design Web pages so that they could assist teachers designing their classroom Web pages.

During the first session of month 6, the writer instructed the students to reinitialize a hard drive and reinstall system software to correct complete system failure. The writer used the second session to train the students to access the server to download applications and files to enable them to assist teachers in installing the licensed or freeware items they requested. The writer also trained them to connect and use digital cameras, LCD panels and projectors, laser disc players and scanners. Additionally, they learned to use the VCR to videotape from the computer.

During the first session in month 7, the writer trained the students to file share using infrared, the network, and local talk. The students assisted the writer with the installation of a writing program on the computers in the computer lab at the request of the language arts department. During the second session, the writer taught the students how to use the Microsoft Exchange program so they could assist the teachers.
During the remaining months of the practicum, the students assisted the writer in networking computers, installing software, and troubleshooting problems. The writer also had them assist her in taking an inventory of all computers, printers, and scanners. The students prepared a HyperStudio presentation about STEP that the writer will show to the sixth graders during the next school year. The writer arranged for a pizza party on the last meeting day to celebrate and to honor the students for the exceptional work they had demonstrated throughout the year.