Technology staff development: key to technology integration

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Abstract
This research paper will examine six areas. First, it will review several successful technology staff programs to support the concept that staff development does make an impact on the students’ learning. Next, the principles that comprise a good staff development program will be examined, followed by an examination of the needs of an adult as a learner. Fourth, after the teacher has acquired new skills, what insures the transfer of those skills into the classroom integrating technology into the curriculum? The concepts that research has found to be successful in the knowledge transfer will be examined. Fifth, to ensure the technology staff development is successful, assessment of the staff development program must take place. This research paper will examine various effective staff development assessment tools. And finally, it would be remiss to not include the funding needs of technology staff development.
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Key to Technology Integration  

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My deep appreciation to Dr. Sharon Smaldino who has patiently and wisely guided me through this learning process. And to my dear Father, who instilled in me by his word and example the love and respect for knowledge.
CHAPTER ONE

Introduction

In the past decade, vast sums of money have been spent on educational technology with the sole purpose of improving student learning. The Office of Technology Assessment (OTA) indicates in its 1995 report that the efforts to improve student learning via the use of technology has not occurred (Fulton, 1996; Harrington-Lueker, 1996). Why haven’t the perceived results occurred? The OTA report states that the answer lies in staff development. This same report revealed that a minimum of 30% of technology budgets should be spent on staff development (Fulton, 1996; Harrington-Lueker, 1996). Harrington-Lueker states the OTA’s report indicates at best staff development comprises 15% of technology budgets. Electronic Learning’s survey in 1995 reported an average of only 8% of technology budgets was being spent on staff development with 28% of the schools not spending any money on staff development (Harrington-Lueker, 1996).

It seems imperative then that the teachers who are responsible of the future of our youth’s education must be provided with the tools to accomplish the challenge at hand. To many of the teachers in the schools, technology is a tool first introduced to them after twenty or more years of teaching. Their undergraduate and little of their graduate education used technology as a learning tool to become efficient, life-long learners. Fads and tools of technology keep changing which compounds the problem of proper integration into the curriculum. No wonder the students are more proficient on computers than their teachers (Harrington-Lueker, 1996).
President Clinton encourages the use of the “four pillars” in building 21st century schools. Computers, curriculum, connectivity, and computers are these pillars. But the one that needs to be emphasized is competency (Fulton, 1996). Hargreaves and Fullan (1992) affirm this concept. They state, “...we have come to realize in recent years that the teacher is the ultimate key to educational change and school improvement” (p. ix). The way to improve learning for the students is to equip the teachers with the needed skills to perform their task of educating the youth. Joyce and Showers (1995) state, “Students respond right away to changes in instruction and begin to accelerate their rate of learning provided that the educational environment is designed to do just that - teach the students to learn more effectively” (p. 59). With the anticipation of what educational technology can achieve for students’ learning, it is imperative that technology staff development take priority in education.

Throughout this research paper the terms staff development and staff training are used interchangeably without any significant difference in meaning. The leaders of the staff development sessions for teachers are referred to as leaders, facilitators, trainers, or staff development teachers. Again, the interchange of these words is without any significant difference in meaning.

**Purpose**

The purpose of this paper is to examine how effective, efficient technology staff development can be best delivered to provide teachers with the tools to integrate technology into the curriculum and impact positively the students’ learning. Fullan (1991) indicates “...in identifying those factors most possible to alter, and most
instrumental in bringing about change at the level of practice - professional development would be at the very top of the list" (p. 287). It is not enough to just deliver staff development: it must meet the needs of adult learners enabling them to transfer their newly learned skills into the classroom and curriculum. This research paper will examine six areas. First, it will review several successful technology staff programs to support the concept that staff development does make an impact on the students’ learning. Next, the principles that comprise a good staff development program will be examined, followed by an examination of the needs of an adult as a learner. Fourth, after the teacher has acquired new skills, what insures the transfer of those skills into the classroom integrating technology into the curriculum? The concepts that research has found to be successful in the knowledge transfer will be examined. Fifth, to ensure the technology staff development is successful, assessment of the staff development program must take place. This research paper will examine various effective staff development assessment tools. And finally, it would be amiss to not include the funding needs of technology staff development. Any staff development program is expensive, however, the innate cost of technology and its ever changing nature only compounds the cost of technology staff development.
CHAPTER 2

Literature Review

The importance of school improvement is realized by the educational community. Recent research has seen that staff development has an important impact on the school improvement movement. The evolution of educational technology with its ability to individualize education also holds promise for a learner's achievement. Two important concepts, therefore, for school improvement lie in technology staff development.

Not only is it urgent that technology staff development takes high priority in education it must be well designed instruction. In the past, training sessions were often one shot approaches to technology training. These efforts have proven totally ineffective. A review of the literature reveals principles and concepts that must be integrated into the design of technology staff development programs. Before this research is reviewed, several successful case studies will be reviewed.

**Case Studies**

There are numerous journal reports on successful technology staff development programs. This research paper will review several of these case studies to grasp an understanding of what is currently occurring in the schools with positive outcomes. **Case Study #1.**

Ingwerson (1996) reports Los Angles (LA) County Schools realized the need to respond to the challenge of determining how schools can integrate technology in an informed, systematic way into the curriculum. Ingwerson, Superintendent of LA County
Schools, explains how the schools began to address the challenge of raising their students’ technology access and usage from the nation’s bottom 10% to the top 10%.

This vision resulted in the birth of the Technology for Learning Initiative. The need for staff development to be top priority was realized immediately. “Train-the-Trainer” model is key to the Technology for Learning Initiative. Six Technology Learning Teams addressed important concepts of educational technology to equip the students for the future.

After one year the training cadres have trained over 2,400 teachers. Surveys indicate these teachers feel prepared to use technology in their curriculums.

Case Study #2.

Koop and Ferguson (1996) report on the Technology Research Exploration for Kids (TREK) Institute initiated by Dana College in Nebraska. The Institute was established to provide a staff development that would provide K-12 teachers with the skills, information, materials, and confidence to use technology in their classes.

After two attempts in 1991 and 1992, Dana College revamped the TREK Institute by extending the period of time the teachers were in training and adding the component of working with school children. TREK Summer Institute has been very successful the last eight years. Year long projects are collaboratively designed by classroom and master teachers. The teachers’ skills and confidence are demonstrated through one project which simulates a space shuttle and Mission Control which integrates sophisticated technology throughout the curriculum.
Case Study #3.

Murphy and Miller (1996) report the Southlake Texas School District addressed the 1981 research of Hanushek that demonstrated a teacher’s academic ability had a greater impact than any other teacher characteristic on students’ standardized test scores. The school district put a three year plan of action together to provide initiatives for the staff to become technologically literate. Murphy and Miller state the incentive has impacted students. Its success is demonstrated by students and teachers working together while using technology in classrooms which were once void of any technology.

Design of the Instruction

Based on the needs of the adult learner, the staff development program and individual staff development sessions must be designed carefully to allow for optimum learning to occur. The principles guiding the actual development of the staff development programs will be examined. In addition, the events which occur during the individual staff development sessions will be studied.

Caropreso and Couch (1996) look beyond education and examine how corporations effectively execute staff development. Because businesses spend large amount of resources on staff training, it must be done effectively and efficiently. Employees must acquire a new skill. The training must also provide motivation for those individuals to apply the new found skills and continue the learning process. Caropreso and Couch maintain to accomplish this task the staff training must be innovative. The lack of innovation can cause three negative results: 1) goals of the training will not be met, 2) learners will not be motivated, 3) learners will not continue the learning
process--learning will cease. These negative results can be aborted by using innovation in the staff development. Caropreso and Couch link innovation to creativity. They stress creativity should be used in the design and presentation of staff training. The actual training permits individuals to perform the task with their own creativity exhibited.

Several categories of creativity that Caropreso and Couch (1996) maintain should be permitted to flourish during staff development are originality, risk-taking, enthusiasm, curiosity, humor, receptors of ideas from others, and reflective time--time alone. Several of these traits are characteristics that the trainer must exhibit when presenting the training while other of these traits are those which the learner must be permitted and encouraged to demonstrate.

Other researches have also designed principles for staff development. Although the emphasis of these principles is not presented for the sole purpose of innovation in staff training, many of these principles are the same as those of Caropreso and Couch (1996). Smith and Ragan (1993), Yocam (1996), Fullan (1991), and Dyrli (1996) all emphasize the importance of creating the staff development program to have specific goal and objectives designed to fit the individual needs of the learner. The training must be learner centered with the objectives clearly stated and outlined. Options must be offered to individuals both in choices of the curriculum that is required to meet their individual needs and the mode of learning they prefer: individual, small group, or large group (Dyrli, 1996). The choices that individuals make in this principle outlined by Dyrli are reflective to the principle of innovation outlined by Caropreso and Couch. That being
individuals must be permitted to be risk takers if innovation and creativity are permitted to be exhibited. Risk taking will be exhibited in Dyrli's concept by the courses the individual chooses and if they opt to study individually.

Certain concepts must also be evident in the individual staff development sessions. To ensure the learning of new knowledge and skills instruction must be designed by the teacher with considerable care (Gagne & Briggs, 1979). Nine events of instruction which occur in well designed lessons are outlined by Gagne and Briggs (1979): 1) gaining attention to assure the learners are ready to learn, 2) listing the lesson objectives to assist the learners in focusing their attention during the entire learning session, 3) recalling previous knowledge serves as a basis on which to build the new knowledge, 4) presenting stimulating new information, 5) providing learning cues/mnemonics, 6) eliciting performance from the learner to check for understanding, 7) providing feedback and more instruction if it is needed, 8) assessing performance, and 9) providing for retention and transfer of knowledge. Smaldino (1993) explains that these nine events are a guide to instruction. When these events are incorporated into the instruction, they "...will help ... to organize the material to insure that everyone has an opportunity to learn. You can be assured that most of your students will respond to instruction with a positive understanding of the content (Smaldino, p. 1)."

Technology staff development sessions must be developed using constructivist learning strategies (Dyrli, 1996; Smith & Ragan, 1993; Yocam, 1996). When using constructivist learning strategies, the trainer takes on the role of facilitating. During the session learners are permitted to acquire new technological skills while creating units of
instruction to use in their classroom. This enables learners to efficiently use their time by acquiring a new skill and actually having a lesson or unit to use in their classroom. While developing the unit, the learners can be encouraged by the trainer to express their own creativity.

Skill building, by the nature of technology, is a necessary part of the development process. Robbins (1997) examined brain research to understand how individuals best learn new skills and found if new information is broken into “chunks,” the individual can better retain the new information. Schatz (1996) as a professor of Instructional Technologies devised the Show/Do/Cue model based on teaching “chunks” of information to insure the learning and retention of the skills taught. Schatz explains that first a few examples the computer program’s capabilities must be demonstrated. The actual skill is taught in small, five minute chunks: first, students only observe; second, they try the skill with instructor leading; and finally, working in pairs with instructor prepared notes, the students try the new skill. Schatz concludes his model by giving a tutorial disk to the student for practice at home. Dyrli (1996) also emphasizes the importance of take home materials to help with the transition as the new skill is practiced and learned on their own.

A great divide exists between teacher’s ability to learn and use technology tools and the actual integration of these tools into daily classroom learning (McKenzie, 1995). Each staff development session is well defined by the presenters outlining steps for the participant to take in launching their investigation. These steps resemble those that Gagne and Briggs (1979) outline in the events of instruction. The emphasis in
McKenzie’s model of staff development is for participants to explore the “problem” and construct a plan of action. By the end of the session, a product or presentation is completed. During this process, McKenzie wants the learner to be challenged into a “higher order” of thinking. “The challenge should require a thoughtful choice (evaluation) or an invention (synthesis). Participants must construct some new meaning for themselves. They will then move from information to insight” (p. 2).

The Adult as a Learner

To successfully construct a technology staff development program that enables the learners to integrate technology into their classes, the needs of the adult as a learner must be examined. Lieberman (1995) states, “The way teachers learn may be more like the way students learn than we have previously recognized. Learning theorists and organizational theorists are teaching us that people learn best through active involvement and through thinking about and becoming articulate about what they have learned” (p. 592). When staff development is approached in this manner, it is no longer just a new idea for a short period of time, but the new knowledge becomes an integral part of the teacher’s life (Lieberman, 1995). Active learning involves hands-on experiences for the learner. The adult learner retains only a small amount of information through a lecture. When the adult is actively involved in hands-on learning, a considerable greater amount of knowledge is retained (Robbins, 1997).

Research conducted by Fullan (1991) establishes that adults, like their students, need the practical, hands-on learning. This influences the sequence of theory and practical application in staff development. Theory usually precedes the practical application in
adult staff development sessions; however, Fullan believes practical application must come first and then the theory. As learning proceeds, the movement continues between the two. This concept is typically used in the K-12 classroom and proves to be equally as effective in adult learning situations.

Wagner and McCombs (1995) identified several other adult learner characteristics to consider when designing staff development. The learner desires to reach a meaningful goal in his learning; consequently, all material presented in a staff development session must have congruent objectives. Another characteristic is that learners link new knowledge to previous knowledge. This characteristic makes it imperative that the trainer knows his “audience” or learners. The trainer must consider the following questions: What are the learners’ previous experiences? What are their likes and dislikes? What areas do they teach? Among other individual preferences, what are their hobbies?

Another learner characteristic stressed by Wagner and McCombs (1995) is that learners enjoy using “higher order” thinking skills. The learner wants to synthesize and analyze the information. Learners are also naturally curious. This is an especially good characteristic to emphasize with technology staff development because of the newness of many of the technology tools and applications. Wagner and McCombs (1995) state yet another learner characteristic to consider is that individualized learning enhances self esteem and increases the rate of learning. To reach the goal of integrating technology into the curriculum, an individualized approach to technology staff development will accomplish that goal much sooner than the idea that “one shoe fits all.”
The learning styles of the individuals must also be taken into consideration when designing staff development (Joyce & Showers 1983). Inflexible training that does not meet the needs of the individual learner can produce negative energy which prevents learning from occurring. This inflexibility also causes dissidence between the trainer and learners. Joyce and Showers (1983) explain, “Caring and considerate instructional designers and trainers can create settings in which training is modulated to the learning style of the teachers” (p. 32). The greater control adults have on their learning experience the greater the transfer of knowledge “...pulling teachers toward more active states of growth...enabling teachers to increase their own personal technology for acquiring fresh ideas and skills” (p. 32).

The Southlake Texas School District demonstrated this flexibility in the design of their technology staff development (Murphy and Miller, 1996). The teachers were given the choice if they wanted to learn individually, collaboratively with a partner, or attend staff development sessions. The effectiveness of providing this option was demonstrated in the fact that during the first year, 97% of the staff completed the technology staff development. The success was further evidenced by the students using technology in their learning.

Sparks and Hirsh (1997) propose that an important component of staff development is for the trainers to facilitate collaborative learning among the adults during the staff development sessions. A high value should be placed on this collaborative learning. For it is when teachers have time to talk and work together, a greater amount of innovation can take place.
An analogy of this collaborative team work is portrayed by McKenzie (1995). He states that partnering allows the adult learners to “traverse” new territory together. McKenzie likens this partnering to rock climbing. Secured by ropes, rock climbers can reach new heights. An adult as a solo learner will usually stay with his “tried and true” methods; however, when secured to a partner and ready support is available McKenzie indicates the adult learner will invest their newly acquired knowledge into their teaching.

**Transfer of Acquired Knowledge**

“The seeds of development will not grow if cast on stony ground. Critical reflection will not take place if there is neither time nor encouragement for it. Teachers will learn little from each other if they work in persistent isolation. Creative experimentation with instruction and improvement will be unlikely if changes are implemented from the outside by a heavy handed administration” (Hargreaves & Fullan, 1991, p. 13). Restating these concepts, to implement knowledge transfer from training to the classroom there is occurrence of key factors: time must be given to teachers for the implementation process; break down isolation among teachers; and leadership must be supportive, not domineering.

Hargreaves and Fullan (1992) state that a minimum of three years must be given to get beyond the difficulties, uncertainties, and disappointments of new initiatives. During this time of implementation, Hargreaves and Fullan explain that teachers will experience different levels of transfer: 1) imitative, teachers will perform exactly as during the training session; 2) mechanical, teachers will perform the same skill in a different manner in the same subject; 3) routine, perform the skills in a routine manner throughout the
curriculum; 4) integrated use, imitative changes to innovation; 5) executive control, integrates curriculum objectives and higher-order thinking skills. Yocam (1996) indicates stages of implementation also occurred with the teachers in the ACOT project. The stages defined by Yocam (1996) are indicative of those found by Hargreaves and Fullan (1992).

In addition to time given to teachers for implementation, isolation among the teachers must be broken down (Hargreaves & Fullan, 1992). Too often teachers perform in an environment that isolates them from their colleagues. Fullan (1991) states, “People need specific ideas, sounding boards, and social support during the critical early period, or else the initial momentum never gets established” (p. 291-292). This support is a critical element to the implementation of new practices; therefore, schools must be creative in finding the time to permit this collaboration among the teachers. This time can be found through readjustment of schedules, redistribution of staff assignments, and regrouping schools around small support groups (Darling-Hammond & McLaughlin, 1995).

Fullan (1992) states it is when teachers share understanding that innovations are sustained. To facilitate this sharing, the boundaries of isolation must be broken down. Teachers need collegial support to make change happen and to sustain change. Fullan further explains that the isolation must be broken down to facilitate teachers coming together for decision making and action to promote peer coaching. Peer coaching promotes transfer of newly developed skills (Robbins, 1997). Robbins examines skills attained and skills transferred based on Joyce and Showers (1981) research. With theory only, 10 - 20% of skills are attained and only 5 - 10% skills transferred. When
demonstration, practice, and feedback are added to that theory, the percentage of attainment of skills rises consistently; however, the transfer of skills only grows to 20%. When coaching is added to the previous stated components, the skills attained is 80-90%. Restated, the most dramatic increase in attainment of skills is when coaching among peers is used during the transfer of skills. Eighty to ninety percent of knowledge is attained when peer coaching is used.

The provisions for these coaching teams should be already established during the staff development sessions (Joyce & Showers, 1983). Joyce and Showers explain the coaching process “...has four major functions: the provision of companionship; the provision of technical feedback; the analysis of application; and, adaptation to the students” (p. 19). The coaching process “reduces isolation and offers genuine support” (p. 21).

The ACOT project also found that teachers must work together but that the change process is an individual process (Yocam, 1996). To support the individual, the teachers must to be able to take the technology home (Solomon & Solomon, 1995). Quinian (1996) states that the Kyrene (Arizona) School District found their research confirms this concept. The Kyrene School District conducted research to determine the positive contributors to technology staff development. “One of the strongest positive correlations in research done to determine the most effective methods to improve the assimilation of computer technology in everyday classroom use by educators was shown to be the correlation of access to computers at home. Teachers who are also home computer users, teachers who were provided computers for home use...all showed strong
positive correlation to use of computers in the classroom...” (p. 7). Whatever the
technique that is used for skill transfer into the classroom, the leadership of the school
must be very supportive to the teachers in their efforts to assist them in being successful.

**Assessing Success**

When assessing the success of staff development, it is no longer adequate to count
how many sessions of staff development were scheduled or how many individuals
attended those sessions (Spark & Hirsh, 1997). In an educational environment where
results are expected, the same must be expected from staff development. “It has become
increasingly clear...that a seat-time view of staff development is incongruous with a
results-driven educational system. Staff development’s success will be judged ... by
whether it alters instructional behavior in a way that benefits students. The goal is
improved performance-by students, staff, and the organization” (p. 5).

Joyce and Showers (1995) stress the concept of assessment. The original goal of
the staff development must be the focus during assessment. That goal centers on student
learning. To be assessed a success, staff development must result in an increase in
student learning (MacGilchrist, 1996; Joyce & Showers, 1995; Fullan, 1991). Joyce and
Showers (1995) explain when evaluating staff development, grades of the teacher’s
students can be tabulated as an indicator of success. These tabulated grades, however, are
not the only indicator of students’ success. The number of student referrals/suspensions
and the increase in quality of student products are also strong indicators of student
achievement.
McKenzie (1995) created a self-assessment rubric for teachers to use for pre-assessment and periodic assessment during staff development. This instrument is also helpful in creating an outline of the teacher's need on which to build the staff development program. As the completion of the rubric is done periodically, it serves as an indicator if the staff development sessions are successful. The TREK program (Koop, et al., 1996) collected research information from the participating teachers on their degree of confidence in using technology and the degree to which they used technology activities in their classroom. The data was collected via a five point Lickert scale, journals, and pre and post assessments. Finally a t-test was used to indicate if the results were significant.

Joyce and Showers (1995) found interviews with staff development participants provided more valuable assessment information than did questionnaires. Joyce and Showers also recommend studying attitudes as a measure of success. When staff became competent in the newly acquired skill (learned in the staff development), their attitude improved; consequently, a study of attitudes can determine if the staff development sessions are successful.

Whatever assessment tool is used, the teachers are anxious to analyze the results (Joyce and Showers, 1995). Teachers find fulfillment in seeing their students achieve (Hargreaves & Fullan, 1992). This achievement by K-12 students is directly correlated to the teacher's own learning and implementation of the new skills. These results must be shared and the success celebrated (MacGilchrist, 1996; Solomon & Solomon, 1995).
**Funding Sources**

A well designed staff development does not come without a price tag. Darling-Hammond (1996) addresses the need to supply financial resources for technology staff development to meet the need of supplying a well developed staff. The government needs to be willing to invest more funds in teacher preparation and staff development programs. This author further explains the funds needed for training can come from government funds otherwise spent on bureaucracies and special programs. Lakerveld and Nentwig (1996) note that in Europe policy change at the government level is being done to assure funds are available for the type of staff development schools need. In the past, European agencies who supplied staff development were given the funds. Now the individual European schools receive the funds to assure the staff development offered fulfills the needs of the local school.

In the United States the federal and state governments are supplying funds for technology efforts and incentives in the schools. Some of these funds are specific to technology which include staff development. Other of the funds are specific to staff development such as the Goals 2000: Educate America Act and Improving America’s School Act which can be written specifically for technology staff development (Harrington-Lueker, 1996). The National Science Foundation (NSF) also funds many efforts in integrating technology into the science curriculum. Technology staff development is included in the NSF’s efforts. The TREK program is an example of this funding by NSF (Koop & Ferguson, 1996).
With school funding tight, it pays to look to other sources for financial support for technology training needs. One avenue worth exploring is grant programs. There are several web sites that have information regarding private entities and foundations who support education and in particular educational technology. The Eisenhower National Clearinghouse (1997) is an excellent on-line site for up-to-date grant information. The web site of ENC has links to government, state, private, and foundation grants.

The school board of Southlake Texas School District realized the need for their staff to be trained before the students could experience the benefit of technology integration in their learning. The school board voted that the annual certified teacher pay raise would be linked to the individual’s professional technology development. Over the course of three years, the district implemented this program with cash incentives for the staff members (Murphy and Miller, 1996).

Some schools are fortunate to have parent organizations that realize not only the need for technology equipment but also the need for technology staff development. Indian Hills School is an example of a PTO with this foresight (Adams, 1997). Realizing the need for their staff to be knowledgeable in technology, the PTO funds two part time technology facilitators to conduct staff development and assist the staff with integration projects. When the Indian Hills principal was asked how long the funding needed to continue, his response was “forever.” Indian Hills principal realized the evolving nature of technology requires support for constant, on-going staff development and that it is a costly venture (Adams, 1997).
CHAPTER 3

Summary

Millions of dollars have been spent on educational technology during the past decade. Many of these funds were spent hoping that increased student achievement would be realized with educational technology. This change has not occurred and school improvement has not been realized (Fulton, 1996; Harrington-Lueker, 1996). The ability of the educational leaders, both classroom and school leaders, is core to school improvement (Fullan, 1991; Joyce & Showers, 1995). Key to leaders improved performance is to have the them properly trained (Fullan, 1991; Joyce & Showers, 1983). The leaders of the schools, however, have been afforded few experiences with using technology during their own education. It is mandatory that government and school leaders realize this need for technology staff development and support it with both resources of time and money.

Many principles and concepts can be learned from successful staff development programs and educational research. The entire staff development program must be well designed with goals and objectives clearly articulated. The program must allow for collaborative, learner centered, hands-on learning using constructivist learning strategies (Smith & Ragan, 1993; Yocam, 1996; Fullan, 1991; Dyrli, 1996). Each instructional session must be carefully designed to meet the learner’s needs and follow Gange’s events of instruction (Gagne & Briggs, 1979). Brain research and other research has shown the best method to teach technology skills is in small “chunks” to provide the greatest knowledge retention and skill transfer (Robbins, 1997; Schatz, 1996). Supportive
materials must be given to the learners to support the retention of this knowledge (Schatz, 1996; Dyrli, 1996).

Research has found that adults learn more like their students than once was realized (Lieberman, 1995). Like their students, adults learn best with active, hands-on learning (Lieberman, 1995; Robbins, 1997). Fullan (1991) emphasized that when adults are learning they need to have the practical before the theory. Instruction that is individualized and meets the individual’s needs will increase the rate of learning and self-esteem (Wayne & McCombs, 1995). Adults also want control of how they learn and what they learn. If this need of control is ignored, negative feelings will be generated towards the instructor and the learning itself (Joyce & Showers, 1983). As teachers learn new concepts, it will take time for them to actually transpose those concepts into full implementation. The greatest need of adults is to learn collaboratively with a colleague (Sparks & Hirsh, 1997; McKenzie, 1995). McKenzie likens it to rock climbing. If adults are on their own they will not traverse new territory; however, linked with a partner new territory will be explored and achieved (McKenzie, 1995).

As teachers learn new concepts, it will take time for them to actually transpose those concepts into full implementation. Learners will go through several phases as they make efforts towards implementation. The leadership in the schools must allow time for this process. Without time for the natural evolution of these learning stages, the adult learner will feel threatened and the implementation will not occur. Teachers will revert back to their old methods (Hargreaves & Fullan, 1991; Yocam, 1996).
Peer coaching is a key to the transfer of the newly acquired skills into the classroom. The nature of our schools places teachers in isolation. As the new skills are being transferred, it is imperative that teachers receive support from their colleagues. This support allows and encourages the innovation to take place (Hargreaves & Fullan, 1992; Joyce & Showers, 1983). This collegial support is especially needed with technology staff development where not only new methods of teaching are being learned but also specific skills. Research has also shown that the greatest positive correlation of transfer of technology skills into the classroom occurs when the teachers have access to the technology in their homes (Quinian, 1996; Solomon & Solomon, 1995).

The success of staff development is best indicated by the achievement of the teacher's students (MacGilchrist, 1996; Joyce and Showers, 1995; Fullan, 1982). Not only should students' grades be tabulated but also involvement in their learning as indicated by number of suspensions and referrals. The quality of student projects is also an indicator of student learning (Joyce & Showers, 1995).

The price tag of well implemented staff development programs is great. This is even further compounded by technology staff development because of the price for the equipment and software. Federal, state, and local governments need to look at realigning budgets to support technology staff development. Outside sources such as grants must also be aggressively pursued.

Fulton (1996) explains that President Clinton has defined the four pillars of education - computer, connectivity, curriculum, and competency - to move the nation's schools into the 21st century. The most crucial of these pillars is competency or staff
development. "Redefining professional development and support, and providing greater, more creative and flexible resources to provide them, are critical components if the pillar of competence is to stand" (Fulton, 1996, p. 82). Fullan's (1991) statement affirms this, "Increasing the resources for an emphasis on staff development, establishing more effective programs, and integrating continual professional development ... are goals to which all educational agencies should be committed; for sustained improvements in schools will not occur without changes in the quality of learning experiences on the part of those who run the schools" (p. 287). With a well developed technology staff development program, the school leaders will be ready to lead the nation's youth well prepared into the 21st century.
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