UNIVERSITY OF OKLAHOMA

GRADUATE COLLEGE

EDUCATOR CONCERNS
ABOUT COMPUTER TECHNOLOGY IMPLEMENTATION
IN A SOUTHWESTERN OKLAHOMA SCHOOL DISTRICT

A DISSERTATION

SUBMITTED TO THE GRADUATE FACULTY

In partial fulfillment of the requirements for the

degree of

DOCTOR OF PHILOSOPHY

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APPROVED FOR THE COLLEGE OF EDUCATION

DEPARTMENT OF EDUCATIONAL LEADERSHIP AND POLICY STUDIES

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Apavitrah pavitro va.
Sarvavasthan gatopi va.
Yah smaret pundarikaksham.
Sa Bahyabhyantarah shuchih.

Jai Guru Dev.

TABLE OF CONTENTS

APPENDIXES (continued)

LIST OF TABLES

ABSTRACT

The implementation of computer technology in America's schools has been costly. Billions of dollars from federal and state governments, businesses, and private sources have enabled school districts across the nation to implement the infrastructure to connect to the Internet and the hardware and software to provide access to technology in classrooms and labs. Providing that infrastructure, hardware, and software is just the first step in computer technology inclusion.

Just as important is technology use after implementation. Such a shift in emphasis, as the literature contended, must provide the necessary resources for technology professional development for the educators involved. This study examined technology inclusion in a southwest Oklahoma school district by isolating investments in such inclusion, identifying educator concerns about such inclusion, and determining technology professional development strategies geared to that inclusion.

This study focused on a constant dilemma faced by American educators: the implementation of an innovation. To investigate the study's research questions, both analysis of existing district data and a quantitative method to isolate educator concerns, the Stages of Concern Questionnaire (SoCQ), were used. Specifically, district overall budgets, professional development budgets, technology plans, and technology professional development strategies were isolated for FYs 1999-2001 to examine technology inclusion. Educator concerns were isolated about the implementation of

computer technology to determine not only immediate educator concerns, but to also address professional development strategies for educators in the district as a result of those concerns. The study was structured in this manner in an attempt to faithfully address the fidelity of implementation issue researchers found important for an innovation.

The study's findings indicated that technology implementation and the effective use of technology after implementation hinged on technology professional development for educators. Concerns reflected through the SoCQ indicated that district educators were primarily still concerned with how to use the implemented technology and how it would affect them. Funding for technology preparation for educators was severely limited after implementation, and although the district had provided a vision for technology inclusion, both the funding and the strategies weren't able to address district expectations for technology inclusion after implementation.

CHAPTER I

INTRODUCTION

Whether simple or complex, the progress of western civilization has been directed by technological paradigms (Riley, Kunin, Smith, & Roberts, 1996). Whetmore (1995) compiled a list of technological advances that helped shift the direction of western civilization over the last six hundred years. These technological shifts began with Gutenberg's foray into movable type in the fifteenth century and most recently resulted in the recognition by the United States government of the importance of computer technology in all areas of American life and especially its importance in education. The importance of computer technology in education can be recognized in the funding allocated for its implementation. Just as important in that recognition, however, should be the amount of funding allocated to determine the effective use of the implemented technology. Wear (2002) noted that the government spent $3 billion on technology implementation for education in 2000, but only a meager $33 million for research and development for its effective use. Despite the enormous financial allocation for technology infrastructure, hardware, and software implementation of computer technology, Wear noted that the Federation of American Scientists in Washington felt not enough financial investment researched the effective use of the implemented technology. Despite such a financial disparity between the implementation of technology and research and development for the effective use of technology, the attention given to implementation has finally begun to shift. In *Critical Issues in Evaluating the Effectiveness of Technology*, McNabb, Hawkes, and Rouk (1999) remarked:

> *The Secretary's conference on Educational Technology: Evaluating the Effectiveness of Technology* on July 12-13, 1999, in Washington, D.C., noted a shift

in schools' focus on technology. Where once the emphasis was on building and implementing a technology infrastructure, today it is on evaluating the effectiveness of its use in schools and classrooms.... Indeed, if resources are to be expended on technology, it is becoming a political, economic, and public policy necessity to demonstrate its vital effectiveness. (p. 1)

It is exactly these foci that provide insight into existing problems with technology inclusion in America's schools after such an implemented technological infrastructure exists. Because public education in America still provides a viable venue to reach millions of Americans, and billions of dollars (Doherty & Orlofsky, 2001; Wear, 2002) have been spent to provide such a technological infrastructure, the impact on the effectiveness of technology after implementation bears evaluation in order to determine important areas of consideration for the effective use of technology in America's schools.

Whetmore (1995) related that the impact of the printing press in fifteenth century Europe was staggering. This technological advance created a nexus for the western world that has been credited with the expansion of literacy and the expansion of nationalism in Europe as people from various areas began to read in their own languages (Burke & Ornsten, 1995). Provided the impact of the fifteenth century printing press in this new millennium, how might what some see as just as influential, computer technology, affect the direction of public education and American society in the future? Perhaps an analogy by Cairncross (1997) might help clarify how important computer technology is today and the influence it might have in the coming decades.

To understand where we are today, imagine the automobile in 1910. Twenty-five years after its invention, it had already evolved into a form we would recognize now.... Most important of all, Henry Ford had started to mass produce it, setting it

> on the way to becoming a standard consumer item. Yet, the immense social consequences of the automobile's development took most of the twentieth century to unfold. Highways gradually paved the routes from railway stations and city centers to suburbs and supermarkets. Jobs disappeared...and new jobs were created.... And it liberated ordinary people (including women) to travel where and when they wished. [Her] book [*The Death of Distance*] starts from the assumption that technology, driving economics, has the power to change the physical world. (p.1)

With these examples in mind, the emphasis on computer technology is understandable. Like previous innovations, yet to be seen or felt are the continuing changes computer technology may foster. No doubt, technology's power to radically shift everything societies have been doing and the way in which they have been doing them might be frightening to some, just as the advent of the printing press, the industrial revolution, and mass production were to past generations. Despite such fears and resistance to change, attention to the importance of computer technology is pressing, especially given the changes researchers have predicted. All areas of life - individual, business, government, and education - have become inundated with computer technology. For educators, however, this emphasis on computer technology as a necessary innovation has created new dilemmas where funding, adaptation to change, and time to implement this technological innovation within individual disciplines to enhance the curriculum are constant concerns. These concerns should be addressed to ensure that the time and money invested in such technological inclusion are worthwhile for students, teachers, administrators, and the taxpayer.

The financial investment alone suggests that the inclusion of computer technology in America's schools be adequately addressed from the implementation stages to the desired effects of such implementation. In other words, it appears logical to plan the inclusion of such an expensive prospect as computer technology from its inception to the desired results. Public school districts should effectively plan such inclusion in a way that looks at desired outcomes. Unfortunately, this has not consistently been the case for previous educational innovations or for the inclusion of technology in education. Educational inclusion of an innovation is nothing new. Hord, Rutherford, Huling-Austin and Hall (1987) noted the difficulty in changing the status quo when an attempt was made to implement an innovation in education.

> Innovations involved with instructional strategies and curriculums have usually failed. Remember the promises held for open classrooms, team teaching, educational television, new math, and inquiry-oriented science? But did these innovations fail because the concepts and processes proposed were faulty? Or because they were never properly implemented? We will never know. Evaluations of implementations have usually focused on the assessment of their effectiveness. This type of assessment, without an examination of how the innovation was implemented, leads to distorted results. (v)

Fullan and Pomfret (1977) corroborated Hord, Rutherford, Huling-Austin and Hall addressed the concerns for the implementation of an innovation in education quite succinctly:

> How best to plan an innovation? How is it best to evaluate it? These elements, however, as important as they may be, do not address implementation questions per se. There is a singular lack of curiosity about what happened to an innovation between the time it was designed and various people agreed to carry it out, and the time that the consequences became evident. Once an innovation was planned and

adopted, interest tended to shift toward the monitoring of outcomes. The assumption appears to have been that the move from the drawing board to the school or classroom was unproblematic, that the innovation would be implemented or used more or less as planned, and that the actual use would eventually correspond to planned or intended use. The whole idea of implementation, what the innovation actually consists of in practice and why it develops as it does, was viewed as a 'black box' where innovations entering one side somehow produce the consequences emanating from the other. (p. 337)

Hall and Loucks (1978, 1977) and Doherty and Orlofsky (2001) certainly noted the difference between the implementation of an innovation and its practical use after such implementation, and they reinforced the importance of planning the inclusion of an innovation from its inception to the desired results. They also suggested several important criteria to consider in the planning process when implementing an innovation in education. First, they indicated that an educational innovation might change during implementation and operation and not look like what was initially suggested. Second, and more importantly, "In sampling for research, evaluation, and even staff development activities, it is essential to have first-hand documentation that the innovative process or product is, in fact, being used and at what level" (Hall and Loucks, 1977, p. 274). Data to reflect an innovation's use is essential. Both Fullan and Pomfret (1977) and Hall and Loucks (1978) referred to an innovation's implementation and its effective use as fidelity of implementation. In regard to computer technology implementation, it appears that the "black box" syndrome continues to bear researching. To assume that implementation of an innovation will magically produce welcome changes appears foolish according to researchers. Just as foolish to assume is that educators are effectively utilizing an innovation simply because it has been implemented. It is unfortunate that the implementation of earlier educational innovations mentioned by Hord, Rutherford, Huling-Austin, and Hall (1987) may not have been met with the time, planning, vision, professional development, and funds necessary to ensure the innovation's practical use. Some 15 years later, researchers have suggested similar concerns with the implementation of computer technology.

Certainly, educators have been challenged by the inclusion of educational innovations. Hall and Loucks (1978, 1977) indicated that successfully including an innovation takes time, money, training, and effective planning. However, the complexity of computer technology may create an even more difficult dilemma for educators to properly use this innovation. Hall and Loucks (1978) contended that the implementation of an educational innovation should vary depending upon the complexity of the innovation. Given the complexity of computer technology, it seems evident that planning and vision must include all stakeholders in the process to make such inclusion successful. Researchers provided numerous examples. McLaughlin (1998) pointed directly to the importance of the role of administrators and teachers to make such inclusion successful by placing the degree of success of computer technology implementation squarely in educators' hands. Others suggested that the "black box' inherent in the innovation process must be filled with adequate training and professional development for such innovations to be properly implemented (Fullan & Pomfret, 1977; Hall & Loucks, 1978, 1977; Hord, Rutherford, Huling-Austin, & Hall, 1987). If the process for computer technology inclusion in America's schools does not include such a vision, then only talk makes its mark, and the purpose of implementing computer technology remains unfulfilled, just as it has for past educational innovations. Migliorino (2002) clarified the issue for technology inclusion and such a vision: "It is logical to assume that because technology is in place, it will have an immediate effect on the way a student learns. It could also be possible that the truly effective utilization of technology in our schools is being blocked by human factors" (p. 1). Migliorino noted that the assumption that administrators and teachers are effectively utilizing the implemented computer technology must not be the focus; rather time, planning, and vision that takes into account all aspects of the process including professional development must be addressed in order to effectively utilize computer technology implemented into America's schools.

Researchers have also noted that the implementation of computer technology is just the first step in a process that must eventually yield results in student achievement. For example, Doherty and Orlofsky (2001) conducted a collaborative survey of 500 students in grades 7-12 as part of a national survey of technology use in the schools with Harris Interactive, Market Data Retrieval, and *Education Week.* The survey indicated that national spending on technology for schools had reached $5.7 billion in 2000. However, despite the expenditure and the infrastructure of hardware and software in place, the survey's findings suggested "that all of the nation's schools – whether rich or poor in technological resources – need to focus more attention on how to use their existing technology effectively in the classroom" (p. 45). Doherty and Orlofsky's survey statistics pointed out that the inclusion of computer technology in schools should be supplemented with the understanding of the importance of properly implementing that technology. Like McNabb, Hawkes, and Rouk (1999), Meyer (2001) indicated that priorities are shifting in regard to attention being paid to other areas of computer technology inclusion in schools other than the acquisition of infrastructure, hardware, and software. Meyer indicated this shift reflected a growing concern among educators – technology related professional development. Meyer remarked that teachers felt they desperately needed such development. In other words, funding for hardware and software must be supplemented with funding for the professional development of educators implementing such changes. In order to adequately address the black box syndrome as noted by Fullan and Pomfret (1977) and fidelity of implementation in regard to technology inclusion in the schools as noted by Fullan and Pomfret and Hall and Loucks (1978), such concerns bear consideration, or computer technology inclusion in America's schools will be incomplete.

Federal funding garnered for the implementation of technology in the nation's schools has been directed by Telecommunications Act of 1996. In order to address what government, business and education considered to be a national priority, the Federal Communications Commission (FCC) adopted on May 7, 1996 a

> ...Universal Service Order implementing the Telecommunications Act of 1996. The Order was designed to ensure that all eligible schools and libraries have affordable access to modem telecommunications and information services. Up to $2.25 billion annually is available to provide eligible schools and libraries with discounts, often referred to as the 'E-rate,' for authorized services... The Schools and Libraries Division (SLD) of the Universal Service Administrative Company (USAC) administers the Schools and Libraries Program. (USAC Schools and Libraries Program, 2000, p. 1)

The USAC Schools & Libraries Program (2000) noted that in order to acquire E-rate discount funding an effective technology plan must be provided by a school district. Initially included in that plan were suggestions for a sufficient budget for professional development in the use of technology. E-rate funding helped school districts across the nation to create a technology infrastructure. However, the majority of funding from E-rate went and continues to go for infrastructure concerns such as wiring and Internet access. Despite such financial help that included an emphasis on a plan and a budget for professional development, just how effective are professional development strategies within districts to ensure the effective use of the implemented computer technology? The responsibility of effective computer technology implementation lies with individual districts and the educators within those districts. How much attention has been given to aspects of computer technology inclusion beyond implementation, especially when districts are provided limited funding to proceed beyond implementation, is the question that needs to be answered?

Statement of the Problem

Funding to supply infrastructure, hardware, and software and constantly upgrade computer technology in education has cost taxpayers billions of dollars. One would assume that such expenditures for inclusion would include a vision for training those responsible for its use and a pan to provide for its maintenance. This appears not to be the rule, however. Relatively few of America's schools have followed researcher suggestions to provide a vision that enumerates the goals of such inclusion, a plan that notes how the implemented technology will be maintained, and most importantly, a professional development strategy that focuses on the effective use of the technology by educators in order to enhance the educational experience of students. The ability to provide adequate time and attention to professional development in order to realize the potential of computer technology among administrators and teachers, that fidelity of implementation researchers found important, has not effectively been addressed. Even if a vision was provided, were districts able to follow the directions within the vision? With the billions of investment dollars in technology inclusion, concerns that relate to the effective use of computer technology must be addressed. The emphasis on technology in America's schools has definitely impacted educators, and researchers have noted the disparity that exists between the implementation of technology and its effective use, a disparity that demands attention. Designing curricula in education that utilize implemented computer technology will be a constant challenge. Just as important are the challenges for the successful utilization of computer technology that include computer technology training for educators in order to enhance such curricula. Such strategies must include a vision and long range planning goals that are followed (Beavers, 2001).

Funding and time to adequately employ the technology in their classrooms must be provided to educators, yet many studies have concluded that this is not the case. Vojtek and Vojtek (1997) reported findings from the Congressional Office of Technology and Assessment that indicated school districts spend 55 percent of their technology budget on hardware and 30 percent of their technology budget on software. This left a meager 15 percent of a school's technology budget for repairs and staff development. These percentages reflected those districts that had such a budget. Nevertheless, despite this dearth of funding for professional development, the success or failure of computer technology in education is still the responsibility of administrators and teachers (Fullan & Pomfret 1977; Hall & Loucks 1978; McLaughlin 1998; Migliorino, 2002). When it comes to the use of technology, educators must be provided technology professional development in order to effectively incorporate such technology. State legislatures, state education departments, and local school districts that take into account a vision for the inclusion of computer technology and a planned professional development strategy for such a vision should have the best opportunity to effectively integrate computer technology into the curriculum. If state legislatures, state education departments, and local school districts fail to provide an overall vision and implementation plan in regard to computer technology that includes effective professional development strategies, then they do students, educators, administrators, and the taxpayer a disservice.

Because this will be a collaborative study between the researcher and the school district, the problem of this study will be to determine the degree to which computer technology had been implemented in the district during FYs 1999-2001 by addressing data that included: the vision and goals isolated in the district's technology plans; how the vision and goals in the technology plans were addressed; district budget allocations including funding allocations for professional development in FY's 1999-2001; district professional development training associated with technology inclusion; and educators' levels of concern in regard to such implementation.

Purpose of the Study

Recognizing the financial investment in the implementation of computer technology in America's schools, legislators, administrators, and educators must attend to how well school districts have been able to utilize the implemented computer technology after such implementation. District responsibility is inherent in such attention. Included in such attention must be the concern for effective professional development strategies for educators after technology implementation. The literature reflected the increasing necessity to provide data driven studies that impact on technology's effective use after implementation.

In collaboration with the district, the purpose of this study was to determine the district's direction toward the implementation and use of technology including professional development strategies for educators utilizing the implemented technology that fidelity of implementation researchers found important. The literature noted the complexity of this innovation's impact on educators. It also indicated that the changes fostered by such a complex innovation in education like computer technology would be difficult for educators to harness and use effectively without adequate training. Sources of district data during FYs 1999-2001 were perused to determine district direction toward the implementation of technology. The data included the district's overall budgets, professional development budgets, its technology plans, and its professional development trainings that specifically related to computer technology during FYs 1999-2001. Next, through a survey termed the *Stages of Concern about the Innovation Questionnaire* (SoCQ), responses from educators were obtained. The data reflected the concerns district educators had with the changes created by computer technology implementation.

Hord, Rutherford, Huling-Austin, and Hall (1987) noted six assumptions about change in regard to an experience with an innovation:

> 1. Change is a process, not an event.
> 1. Change is accomplished by individuals.
> 1. Change is a highly personal experience.
> 1. Change improves developmental growth.
> 1. Change is best understood in operational terms. [and]
> 1. The focus of facilitation should be on individuals, innovations, and the context.
>
> (p. 6)

Given Hord, Rutherford, Huling-Austin and Hall's assumptions pertaining to change, it became clearer as to why the district and the researcher wished to determine educator concerns in regard to the implementation of computer technology. Effective use of the technology comes only after the consideration of these six criteria that deal with innovations and change, and district direction toward the implementation of the technology should provide educators with opportunities to deal with such change. Hall, George, and Rutherford (1998) noted that the "composite representation of the feelings, preoccupation, thought, and consideration given to a particular issue or task is called concern" (p. 5). The SoCQ has been a highly regarded instrument to measure concerns in regard to an innovation.

It was important to isolate district educator concerns in regard to the implemented computer technology in order to determine two important criteria. First, isolating such educator concerns might provide an idea of how the district had prepared and continued to prepare its constituents with the implementation of computer technology. Second, isolating such educator concerns might provide specific professional development strategies that address these educator concerns in order to use the implemented technology more effectively. Hall, George, and Rutherford pointed out such specificity in regard to educator concerns was recommended because change can not be forced by an outside agent. Rather, change is an individual dynamic. This type of emphasis toward the implementation of an innovation, especially one as complex as computer technology, required school districts to have the planning and the funding to implement that planning available. It also required a vision that included continual attention to that innovation.

The research questions that were structured for the study related to FYs 1999-2001 and the perusal of the district's overall budgets, the district's professional development budgets, the district's technology plans, the district's professional development training that specifically related to computer technology, and the district's educator levels of concern. They were:

1. What (if any) was the percentage of funding in the district devoted to professional development toward computer technology training?
1. How much time (if any) was provided to teachers and administrators to enhance their computer technology skills in the professional development strategy?
1. What were the district's plans (if any) for a staff development strategy that incorporated computer technology?
    - Were there follow-up procedures that included long-range training in computer technology?
    - Did the district channel its resources and train to the various levels of abilities among its staff (i.e. novice, intermediate, advanced)?
4. What kind of computer technology training (if any) was being implemented?
    - Was the training for administrative purposes?
    - Was the training for classroom integration?
    - If both training for administrative purposes and training for classroom integration were focused on, which was done first and why?

5. What were educator levels of concern as they related to the implementation of computer technology?

Significance of the Study

Given the financial investment and educational focus attached to the inclusion of computer technology in education, it became relevant to assess the way such inclusion was being implemented and the degree to which educators were utilizing the technology. Like Fullan and Pomfret (1977), Hall and Loucks (1978), and Migliorino (2002), Beavers (2001) focused on a professional development strategy that included a vision that not only focused on technology implementation, but one that also addressed the relevance of professional development. Researchers suggested that planned professional development with a vision that included funding, time, and constant instruction were key. This collaborative study with the district attempted to address these concerns and provide the district with data to develop professional development strategies for computer technology inclusion. For Migliorino, Hall and Loucks, Fullan and Pomfret, and Beavers, proper planning, proper implementation of both the hardware and software, and a viable professional development component were important. That the emphasis by Beavers included time and funding for professional development continued to reflect an ever-growing concern among researchers and educators of the responsibility inherent in technology inclusion in the schools. The district took a step in the right direction in order to at least determine educator levels of concern toward the implementation of computer technology in an effort to develop professional development strategies.

It should be noted that a professional development strategy was initially required as part of a submitted technology plan to acquire E-rate funding for technology implementation in any public school in America. However, the inclusion of such a strategy did not necessarily promote such a strategy's effectiveness. Nor did it force a district to complete its professional development plans when implementing technology. Vojtek and Vojtek (1997) noted that usually only 15 percent of a school's technology budget might be allocated for repairs and staff development, if such a budget even existed. The obvious questions were: was enough of the investment in technology inclusion in the schools being diverted toward training those responsible for the education of students, and was planning to provide such training placing attention on teacher confidence in such use? It is one thing to provide the hardware and software to educators; it is another to make sure the hardware and software are adequately utilized. Cybela (1997) isolated a key element with the inclusion of any innovation in America's schools that other researchers have noted as well: the role of the educator. To make sure the implemented computer technology is effectively utilized is the responsibility of educators. Local district educators are responsible for the transition that is taking place in education as computer technology continues to influence its direction.

This study provided insight into a constant dilemma faced by American educators: the implementation of an innovation without an adequate vision or attention to such a vision to address all aspects of the implementation process. Specifically, within the study's participating district, insight was provided into the intent of the district prior to the implementation of computer technology and the ability of the district to harness the use of the technology after implementation. Educator concerns were isolated as well toward the implementation of computer technology to determine not only immediate educator concerns, but to also address professional development strategies for educators in the district as a result of those concerns. The study was structured in this manner in an attempt to faithfully address the fidelity of implementation issue researchers found important. As such, the research may provide other districts with information to either continue with or change their directions with the implementation of computer technology and professional development strategies. It may also provide taxpayers an avenue to determine whether their money has been invested wisely as far as the use of the computer technology after implementation.

Are Oklahoma school districts effectively utilizing computer technologies? Are effective professional development strategies that include vision and long-range training being considered? Are educators satisfied with the strategies being employed in their districts? This research reflected the emphasis that an Oklahoma school district attached to the inclusion of computer technology; it also reflected the concerns of district educators who were utilizing the implemented technology and the district's technology professional development strategies that were incorporated. As noted earlier, the importance of fidelity of implementation for educational innovation was evident in the literature (Fullan and Pomfret, 1977; Hall & Loucks, 1978). Herring (1999) summed up researcher concerns in regard to computer technology implementation in America's schools today and the importance of generating data to determine how well it has been used: "...it can be argued that the education system has not done an exemplary job of evaluating the impact of the technology it has implemented" (p. 31).

Assumptions

1) Since E-rate participation by the nation's schools required a professional development component within a district's technology plan, information supplied by the district in the study included:

- the percentage of funds earmarked for professional development in computer technology;

- the time allocated for such development;
- where the emphasis lay in such staff development; and whether there were follow-up programs for continued training.

2) Permission to peruse the district's overall budgets, the district's professional development budgets, and any other related technology funding for FY's 1999-2001 was given.

3) Permission to peruse the district's technology plans was given.

4) District permission was given to generate the SoCQ to determine administrator and teacher stages of concern with the implementation of computer technology. Hord, George, and Rutherford (1998) noted that the instrument was validated over a three-year period and was preceded by 10 years of development and measurement. "The resulting SoC Questionnaire was tested for elements of reliability, internal consistency, and validity with several different samples and eleven different innovations" (p. 9).

5) The educators comprising the study sample responded to the SoCQ honestly.

6) The educators comprising the study sample were representative of administrators and teachers in similar school districts in the United States.

Limitations

1) Given that the research focused on a specific school district in southwest Oklahoma during FYs 1999-2001, generalizability of the study might be limited. However, the research might reflect usable comparisons for other districts in Oklahoma and the nation that might be used to evaluate educator stages of concern in order to address a district's professional development strategies.

2) The number of surveys returned from district educators might be an inhibiting factor.

3) The study depended on educators honestly responding to the SoCQ to adequately determine their concerns with the implementation of computer technology.

Definitions

Concerns

"The composite representation of feelings, preoccupation, thought, and consideration given to a particular issue or task" (Herring, 1999, p. 11).

District

The use of "district" refers specifically to the southwest Oklahoma school district isolated in the study.

Fidelity of Implementation

Research by Fullan and Pomfret (1977) and Hall and Loucks (1978), in what could be seen as seminal research into the adaption to innovations, suggested the attention between the implementation of an innovation and the effective use of an innovation after implementation as "fidelity of implementation."

(Computer) Technology

Telecommunications services and Internet access, including computers and peripheral equipment, staff training, software, and a budget for operating costs and maintenance. (USACSLD, 2000)

(Technology) Implementation

The use of "implementation" refers primarily to the implementation of computer technology infrastructure and hardware and software acquisition in education without the attention needed to effectively utilize the implemented technology infrastructure and hardware and software.

(Technology) Inclusion

The use of "inclusion" refers primarily to both the implementation of computer technology infrastructure and hardware and software acquisition in education and to the attention paid to professional development after technology implementation to effectively utilize the implemented technology infrastructure and hardware and software.

Technology Plan

The technology plan documents the library service strategy or the school improvement purpose of requested telecommunications services or Internet access under the Universal Service Program. Under the Universal Service program, technology planning must not be treated as a separate exercise dealing primarily with networks and telecommunications infrastructure. The hardware alone is not enough. Approved technology plans must establish the connections between the information technology and the professional development strategies, curriculum initiatives, and library objectives that will lead to improved education and library services. (USACSLD, 2000)

Professional development strategy

An instruction function for developing, adapting, and delivering staff training activities to help teachers and administrators expand their repertoire of teaching and management strategies. (Metzdorf, in Caldwell, 1989)

Stages of concern about computer technology implementation

The seven levels measured by the Stages of Concern Questionnaire (SoCQ) that reflect the "feelings, preoccupation, thought, and consideration given to a particular issue or task" (Herring, 1999, p. 13).

Organization of Study

This study was organized using the traditional five-chapter quantitative analysis approach to research. Chapter one introduces the direction of the research and included: Introduction; statement of the problem; purpose of the study; research questions; significance of the study; implications of the study; assumptions of the study; limitations of the study; definitions for the study; and organization for the study. Chapter two reviews the literature that included the impact of technology in education, the importance of professional development strategies as they related to fidelity of technology implementation in education, change theory as it applied to innovation inclusion in education, and adult learning theory as it related to professional development for educators. The discussion on change theory included the Concerns based Adoption Model (CBAM) from which the SoCQ eventually developed. Chapter three describes the methods used in designing and conducting the study and included the survey used to determine educator stages of concern toward the implementation of computer technology, the SoCQ. Chapter four presents the analysis of the existing data provided by the district and the analysis of the district survey to isolate educator concerns toward the implementation of computer technology. Chapter five provides the summary of the research, conclusions, recommendations, and implications.

CHAPTER II

LITERATURE REVIEW

Introduction: The Influence of Computer Technology

There is no doubt that the technological revolution has influenced American education (Biagi, 1999; Riley, Kuhn, Smith, & Roberts, 1996; Whetmore, 1995). From the United States government's most recent monetary investments on technological enhancement in education to local school district attempts to incorporate new technology, a shift in educational emphasis has taken place. Initially, this emphasis was concerned primarily with the implementation of computer technology in the nation's schools. However, with billions of dollars already invested in implementation, concerned parties in government, business, and education are now shifting their attention to whether or not the implemented technology is being effectively employed. McNabb, Hawkes, and Rouk (1999) noted that the emphasis on technology evaluation after implementation has become just as much a pressing priority. "Indeed, if resources are to be expended on technology, it is becoming a political, economic, and public policy necessity to demonstrate its vital effectiveness" (p. 1). Trotter (2002) noted that the United States Department of Education plans a three-year study to determine the effectiveness of using technology to improve learning and will spend $15 million to do so. He quoted Secretary of Education Rod Paige: "It's now time for the next step, [to see how technology] is applied to the curriculum " (p.23). At the same time, however, Trotter and Hoff (2002) also noted that "incentives intended to improve teachers' skills in the use of technology and to bridge the 'digital divide' would be cut under president Bush's proposed fiscal 2003 budget" (p. 33), a $62.5 million reduction. This disparity bears consideration because on the surface it would certainly appear that curriculum success in regard to computer technology inclusion could not be had without educators' proficiency in that area of expertise.

Whether concerns for computer technology inclusion in America's schools dealt with its implementation or more recently with its evaluation, business and government have helped direct this shift towards the importance of technology inclusion. No doubt, such emphasis by these entities only gives greater support to the importance of technology inclusion. For example, in an advertisement by Southwestern Bell (Lawton Constitution, April 16, 2000), a telecommunications conglomerate, it was noted that Bell will "install video equipment in more than 200 public schools and vocational technical centers that do not currently have equipment [and] establish a $30 million education information technology fund to provide high-tech tools for Oklahoma schools in an effort to provide better educational opportunities for our children" (p. 5A). The United States government responded just as dramatically to private investment in technology for America's schools when it structured the Telecommunications Act of 1996. The Act helped foster the implementation of computer technology by offering billions of dollars to the nation's schools in what became termed as E-rate funding.

On May 7, 1997, the Federal Communications Commission (FCC) adopted a Universal Service Order implementing the Telecommunications Act of 1996. The Order was designed to ensure that all eligible schools and libraries have affordable access to modern telecommunications and information services. Billions of dollars are allocated annually to provide eligible schools and libraries with discounts, often referred to as the 'E-rate,' for authorized services (USACSLD, 2000). In the first year of E-rate funding through the Schools and Libraries Division (SLD) of the Universal Service Fund monitored by the Federal Communications Commission (FCC), January 1998 - June 1999, schools and libraries filed 30,120 applications seeking discounts on telecommunications services, Internet access, and internal connections. The SLD funded 25,785 applications allocating more than $1.66 billion. The SLD received more than 32,000 applications requesting approximately $2.435 billion in E-rate discounts the second year, and on May 27, 1999, the FCC voted to fully fund the E-rate at $2.25 billion. E-rate funding requests totaled 36,000 applications for a possible $4.72 billion in discounts in 2000 (USAC, URL, May 1, 2001). Both private and public interest in technology inclusion for America's schools was evident.

Whereas private and public interest in education and money allocated to education sounded promising, the shift toward increasing technology in the public schools was controversial to say the least, and Southwestern Bell's advertisement reflected some of the reasons why. First, the advertisement suggested that there might be a correlation between the installation and use of technology in the schools and a better education. It was exactly this concern that the Department of Education's study (Trotter, 2002) attempted to address. Second, the millions of dollars spent by Bell were minimal compared to the amounts invested by government, other businesses, and educational institutions across the country. For example, in a settlement between the government and technology giant Microsoft, the company planned to invest one billion dollars in technology implementation (Trotter, 2001). Oppenheimer (1997) noted in "The Computer Delusion" that government might invest anywhere from $40 to $100 billion in education through 2002. According to Oppenheimer, however, and despite public and private investment, these dollars do not necessarily translate into a better learning environment. That the billion-dollar investment by Microsoft was coupled with only a $160 million investment in training (Trotter, 2001) should raise concerns. This obvious financial disparity between the implementation of computer technology and the training in computer technology should easily be seen as a problem.

Migliorino (2002) noted the assumption that all is going well when it comes to computer technology inclusion in America's schools was unjustified. Holland (2001) pinpointed such an assumption when it came to such a limited investment in education for professional development and its supposed focus on responsibility in regard to computer technology implementation. She summarized her mixed methods case study in a middle school by quoting Scheingold:

> The bottom line of this study is to affirm that the human element in school reform cannot be overemphasized. District and campus administrators, and teachers themselves must recognize that as Scheingold (1990) has aptly put it: 'the challenge of integrating technology in the schools and classrooms is much more human than it is technological...it is not fundamentally about helping people how to operate machines. Rather it is about helping people, primarily teachers, integrate these technologies into their teaching as tools of a profession being redefined through the incorporation process' (p. 264).

Apparently, the human element in education has not garnered enough attention over the past 12 years as researchers continued to point to such lack of commitment for professional development in computer technology inclusion in America's schools.

Finally, after billions of invested dollars for technology implementation, government and private entities that have provided funding are beginning to note what researchers of technology implementation have been suggesting for years. Is such implementation being wisely used? Studies have begun to determine whether a correlation exists between student success and the inclusion of computer technology in the curriculum and whether or not the inclusion of technology will enhance the educational experience as a whole. Neither of these foci, however, can be adequately addressed without looking into the professional development of educators as it concerns computer technology because the effectiveness of such an investment is in the their hands. Obviously, the effective use of the implemented technology should be preceded by well trained educators (Fullan & Pomfret, 1977; Hall & Loucks, 1978, 1977). Vojtek and Vojtek (1997) noted that usually only 15 percent of a school's technology budget might be allocated for repairs and staff development. Was enough of the investment in technology inclusion in the schools being directed toward training those responsible for the education of students? It is one thing to have the computer technology in place; it is another thing to use it properly in an educational setting. Are investors and taxpayers to assume that effective use of the implemented technology is taking place? Migliorino (2002) obviously noted that such an assumption certainly does not necessarily enable educators to effectively utilize the technology. Herring (1999) pinpointed the concern: ...it can be argued that the education system has not done an exemplary job of evaluating the impact of the technology it has implemented" (p. 31). The focus of these researchers as it pertains to the effective use of the implemented computer technology might be summed in the following expression: once the cart is in place, is the horse in the right place to make it go in the right direction? Opinions differed on both the impact and the effective use of computer technology in America's schools. These opinions, however, continued to point to the apparent piecemeal efforts directed toward computer technology inclusion.

Biagi (1999), a university journalism instructor and author of *Media Impact*, certainly depicted the positive extreme of technology when she noted: with the infusion of technology the "new media universe could become a purer reflection of the real universe than any medium yet created with unprecedented potential, like all mass media, to both reflect and direct the culture" (p. 227). Like Cairncross (1997), Biagi reflected on the possible influence of technology both visible and yet to be seen. Its potential will continue to be realized, but the changes are so continual that it becomes difficult to visualize such changes on a day-to-day basis. It is understandable that government, business, and education are paying attention to such potential. Closer to home, *The Instructional Technology Plan* (1996) formulated by the Oklahoma State Department of Education (OKSDE) indicated that a revolution is occurring "which will determine how the average American will access, process, and communicate information in the next century" (p. 1). The plan continued that technology incorporated into the classrooms

> ...holds three promises for curricular reform and improvement. The first, and most obvious, involves the training of students in the use of computer and telecommunications technologies. These are the skills which are already in the greatest demand in the workplace today and which will be even more so in the workplace of the future. Secondly, the use of computer technology has been shown to be the greatest change agent in improving how students learn and how teachers teach.... Finally, students acquire skills in accessing and applying information. The new communications and information access technologies are transforming research and scholarship. The Internet has made it possible for students to become part of the universal community of scholars. (p. 2)

In light of such technological potential indicated by Biagi (1999) and the OKSDE (1996), Riley, Kunin, Smith and Roberts (1996) remarked that technological literacy is a pressing national priority. However, they also observed that education is falling far short of meeting this technological priority. They indicated:

> Computers and informational technologies are transforming nearly every aspect of American life....changing the way American's work and play, increasing

> productivity, and creating entirely new ways of doing things. Every major U.S. industry has begun to rely heavily on computers and telecommunications to do its work. ...so far, America's schools have been an exception to this information revolution. (p. 9)

Again, like Biagi (1999) and Cairncross (1997), Riley, Kunin, Smith and Roberts (1996) noted the relevance and importance of technology and the rapidity in which it continues to foster changes in society. However, it is not just how information can be accessed that bears consideration with technology implementation in American society in general and in American schools specifically. Perhaps Cybela (1997) reflected that sentiment best when she noted the importance of the process inherent in education, a process that is overwhelmingly controlled by teachers and administrators. Theorists in the educational arena continually referred to its [education] primary purpose, to educate, and noted that, despite the present pervasive nature of technology, it is only an innovation to possibly enhance one's educational opportunities (Cybela, 1997; Oppenheimer, 1997; Postman, 1992, 1995). It should be noted that these researchers' ideas related the importance of the educator and the innovation, as well as the ability of the educator to properly use the innovation. Herein lay an important insight. There were obviously layers that needed to be addressed when considering computer technology in the schools – the innovation, the educator, and proper implementation of the innovation. What good was it to have computer technology without educators' ability to integrate the use of it into the curriculum? Holland (2001) put that particular concern into perspective. In a case study that involved a middle school and teachers' professional development in technology, Holland came to an interesting, but what appeared to be an obvious and disconcerting conclusion. She certainly corroborated Vojtek and Vojtek (1997) and the emphasis given to technology implementation as opposed to technology professional development.

> The majority of the District's resources in the area of technology, however, have been allocated to expanding hardware and maintaining equipment on every campus, sometimes at the expense of teachers' professional development and assistance. What is known, is that in the end for technology to succeed, as much time and money must be invested in teachers as is invested in the hardware and software. (p. 260)

Some 15 years ago, research by Fullan and Pomfret (1977) and Hall and Loucks (1978), in what could be seen as seminal research into the adaption to innovations, suggested the same conclusion. They referred to this attention between the implementation of an innovation and the effective use of an innovation after implementation as fidelity of implementation. It appears somewhat ironic that educators are presently struggling with the implementation of computer technology and its effective use in America's schools because Fullan and Pomfret and Hall and Loucks remarked on what continues to be a recurring problem in education: Assumptions of value for an innovation continued to take precedence over the evaluation of an innovation after implementation. In other words, far too much attention has been given implementation, and not enough attention has been given to its use after an innovation's implementation. Effective use was assumed. McLaughlin (1998) perhaps stated the implementation problem as well as any researcher. "What actually happens as a result of a policy [innovation] depends on how policy is interpreted and transformed at each point in the process, and finally on the response of the individual at the end of the line" (p. 72). Like Holland (2001), McLaughlin referred to a process that included a vision from the inception of an innovation to its effective use by those individuals employing the innovation. Unfortunately, such visions have been rare. The implementation of computer technology in America's schools has been no exception to this lack of vision.

Another obvious assumption was that most innovations provided throughout the millennia only brought prosperity and positive change. This was a naive assumption as most innovations both gave and took away. Cairncross' (1997) reflection on the changes that occurred after the advent of the mass production of the automobile provided insight into the difficulty that exists with the emphasis on computer technology in society today. It is an emphasis that conjures positive and negative images with researchers and theorists espousing each extreme.

Many researchers commented on the positive importance of this direction. White and Bretz (1998) pointed out: "The technological advancements of the 20th century set the stage for a key paradigm shift that is now taking place in the information arena, a shift from 'distribution' of information to one of 'access' to information" (p. 1). Other researchers indicated that educators considered the ability to access information through computer technology paramount for the coming generations of Americans (Biagi, 1999; OKSDE, 1996; Reynolds & Plucker, 1999; Riley, Kunin, Smith and Roberts, 1996; White & Bretz, 1998; Wright 1999). Reynolds and Plucker relayed how people share and gather information "gained momentum during the past 10 years, forever transforming the way we think about communication, information, problem solving and technological learning" (p. 8). Hughes (1993) remarked that for over fifty years many have dreamt of the concept of a universal database like the World Wide Web. Some ten years later, the technology that presently harnesses the power of the Internet changes on a daily basis, and all aspects of education, business, and government have been influenced to the point where each has become inundated with the technology. Wright (1999) culminated these positive comments by researchers when he suggested a striking, yet perhaps difficult possibility with which to come to grips: "Even by some of the less breathless accounts, the World Wide Web could prove as important as the printing press ..." (p. 221). Such a comparison was staggering in its possibilities.

Despite such positive emphasis, numerous other researchers did not assume that the use of computer technology in education would produce entirely positive results. Postman (1995) in *The End of Education* noted the effects of television on children, a medium that provided the "the single most substantial source of values to which they are exposed" (p. 33), the commercial. According to Postman, it could be argued that the medium did not evolve into the savior it was advertised to be. How like the television is the new computer technology? One could argue as Postman did that the new technology was far more influential and pervasive than the television. Oppenheimer (1997) noted "the danger that even if hours in front of the [computer] screen are limited, unabashed enthusiasm for the computer sends the wrong message: that the mediated world is more significant than the real one" (p. 53). Postman quoted Theodore Roszak who elucidated on the observation that the emphasis on technology was overrated, and Roszak's answer placed the direction of education beyond the apparent hype of the relevance of past and present technology. This direction was what Postman referred to as the metaphysical problem in education.

> Too much apparatus, like too much bureaucracy, only inhibits the natural flow [of teaching and learning]. Free human dialogue, wandering wherever the agility of the mind allows, lies at the heart of education. If teachers do not have the time, the incentive, or the wit to provide that; if students are too demoralized, bored or distracted to muster the attention their teachers need of them, then *that* is the

> educational problem which has to be solved—and solved from inside the experience of the teachers and the students. (p. 27)

No doubt, in their criticism on the emphasis of implementing innovations in education rather than on an appropriate emphasis for the importance of educators effectively utilizing the innovation, Roszak and Postman, like other researchers (Fullan & Pomfret, 1977; Hall & Loucks 1978; McLaughlin 1998; Migliorino, 2002) still noted the relevance of the instructor in the classroom and his or her ability to utilize the tools available to provide an effective education for students. Presently, that educators' tools involve the use of computer technology may only make it more difficult for the educator, especially if inadequate funding for technology professional development continues to be the precedent. As researchers have noted, an innovation like the implementation of computer technology demands it be coupled with adequate resources for professional development.

Despite the disagreements among researchers and the usually piecemeal efforts toward technology implementation and technology effective use, few argued that computer technology implementation in America's educational system has created a myriad of new educational opportunities. Lucas (1998) remarked, "distance learning in all its various manifestations is growing like the proverbial Topsy. Hundreds of U.S. institutions, public, private, large and small, are getting into the business of on-line instruction and are frantically searching for the right match between students and programs" (p. 14). Lucas also indicated that in February 1998 the U.S. Department of Education released the results of a two-year survey that indicated one-third of post secondary schools offered distance-learning courses in the fall of 1995. Both Spodick (1995) and Steiner (1995) suggested the importance of access when discussing the possibility of beginning course work or training at any time, rather than at the traditional pre-set times. Traditional modes of instruction have already begun to change with the emphasis on computer technology. However, it was not only educational access that was shifting. As McNabb, Hawkes, and Rouk (1999), Cybela (1996), and Sherry (1996) pointed out, the importance of planning and the importance of student needs were also beginning to garner attention in regard to computer technology. In a speech given to the Association of American Medical Colleges in Washington D.C. in 1998, Stanley Chodorow, Provost at the University of Pennsylvania, noted the increased need for technology use in education:

> Despite the fundamental adjustments that will be necessary, the author [Chodorow] sees the electronic revolution in education as a necessary consequence of what is already taking place in research, where multimedia packages and the Internet are being used extensively, because in professional education, teaching and learning arise from research. (p. 1)

Gifford (1999), a higher education contemporary of Chodorow and complementing Cybela (1996) and Sherry (1996), noted that educational reform that offered technology implementation "must include realistic plans for incorporating well-crafted, well-designed and comprehensive computer mediated instructional materials into the mainstream collegiate teaching and learning enterprise" (p. 19).

The importance placed on computer technology at the higher education level should be an indicator to common education that the shift toward the inclusion of computer technology in America's schools was pressing. Just as important, as researchers have emphasized, such inclusion should include a concerned emphasis on professional development. With the billions of dollars spent on computer implementation, such attention becomes a necessity. Hord, Rutherford, Huling-Austin, and Hall (1987), in formulating their seminal research that led to their Concerns Based Adoption Model (CBAM) strategy toward an innovation in education, focused directly on a hierarchy when it came to adapting to change. The effective use of the implemented computer technology in America's schools is an innovation in which educators have to adapt radically to a drastic change in educational emphasis. Hord, Rutherford, and Huling-Austin and Hall focused on the disseminator of the innovation, the educator. It was an emphasis that isolated the importance of professional development in the implementation of computer technology.

> A central and major component of the CBAM is that the single most important factor in any change process is the people who will be most affected by the change. Certainly, the innovation itself and the organization into which it is to be incorporated are important variables, but they are secondary in importance to the people who are the intended innovation users. (p. 29)

Hord, Rutherford, Huling-Austin, and Hall (1987) also noted that adaption to an innovation may be approached from either the bottom up or the top down. In other words, teachers in the classroom can provide strategies to adapt to the innovation or the principal or district staff may provide such strategies. Either direction can work. Of course, the best option would be a collaborative effort. However, what cannot be eliminated from the process according to Hord, Rutherford, Huling-Austin, and Hall was that, "The important factor in all cases, whether at the single teacher level or at the level of all teachers across a district, is the support and assistance provided to make a change. If properly facilitated, both can work" (p. 8). Researchers constantly pointed to the educator as the key to an innovation's success. Researchers also noted that a vision that included support and assistance at all levels of implementation that led to better use of the implemented innovation, in this case computer technology, must be developed if America's educators are to effectively transform the implementation of computer technology into effective student use and student success.

Technology's influence and its use among millions of people worldwide continue to skyrocket. American legislators and educators must pay heed to this technological influence and the people who are influenced. One group funds the technology; the other must use it effectively. Reynolds and Plucker (1999) related that technological changes in the acquisition and dissemination of information have made it not only necessary, but also mandatory for those who must use the implemented technology in education to become technologically literate. Given the present set of circumstances with technology implementation, it was unfortunate that the technology monster stood at the educator's classroom door. Yet, according to the literature, it was left to educators to tame the beast. Chodorow (1988), Gifford (1999), Reynolds and Plucker (1999), and Wolosoff (1998) noted that the importance of effectively utilizing the technology was directly aligned with technology professional development for educators to help accomplish such effective utilization. Otherwise, those aspects that were to be enhanced in education by the inclusion of computer technology might actually be hindered by careless application. Hill (1999) affirmed their contentions. She suggested that education may fail to meet the needs of learners and society because the rapid rate of technological growth, exponential in nature, is restricted by the very structure of the profession itself - slow to adapt and change and under the constant control of state and federal dollars. Even if the dollars allocated to education through legislative action, federal E-rate funding, or grants are enough to include the hardware and the software in the schools, will they be enough to provide adequate resources for the educator's ability to use and direct that technology? Thus far, research reflected the opposite: too much attention was focused toward implementation of the technology, and far too little funding was focused on professional development for the effective use of the technology

Unfortunately, in school districts all over the nation, education has not kept pace with the ever-changing nature of technology. In the context of the current study, the Oklahoma State Department of Education's Instructional Technology Plan (OKSDE, 1996) observed that:

> David Thornburg, author of *Edutrends 2000: Restructuring Technology and the Future of Education*, notes that many people consider this to be the information age; when in fact, the industrialized world has moved through that age and into the communications age. Most of our schools still find themselves using teaching methodologies and resources first developed at the time of the industrial revolution, teaching children as if they were still living in the American agrarian society of the 19th century. (p. 1)

Given the complexity of computer technology and its impact on education, teaching methodologies should change. So does how attention is paid to such educational innovations as technology inclusion. And yet, employment of industrial methodologies for computer technology implementation and professional development continue to be utilized. Riley, Kunin, Smith and Roberts (1996) cited some relevant statistics regarding their concerns on the importance of technology inclusion in the schools and the facts behind that inclusion. "Only 4 percent of [America's] schools have a computer for every five students - a ratio sufficient to allow regular use. Only 9 percent of classrooms have connections to the Internet" (p. 9). The OKSDE even goes so far as to distinguish the kinds of computers to students when considering ratio. The ratio between the numbers of computers to students in Oklahoma is 4.2 students to one computer when taking all computers into account (Oklahoma Technology Report Card, 2001). According to Riley, Kunin, Smith and Roberts, this is above the average suggested by the Department of Education in Washington.

However, when considering what the OKSDE considers a standard computer, one within certain hardware parameters, the ratio dips to 6.15 students to one computer. This is below that national standard (Oklahoma Technology Report Card, 2001). These statistics reflected even greater concerns when looking at the four quadrants that the OKSDE divided the state. In the northwest part of the state and the panhandle, the ratio jumped to 11.38 students for one computer. Such statistical attention in regard to implementation of computer technology was certainly important, but it distracted attention from more pressing concerns. As noted by Thornburg, our attention to computer technology implementation was rooted in antiquated methods. To attribute the importance of implementation to mere numbers was not enough. The implementation of computer technology was just the tip of the proverbial iceberg when it came to effectively utilizing that technology in the classroom. As researchers indicated, it was not only the ratio of students to computers that was relevant. It was not all about the hardware and software. Presently, a deep funding chasm exists when it comes to a pressing priority that demands attention: a vision that includes not only technology implementation, but also attention to the process that will enhance the educational experience for students. Such a vision should include professional development in computer technology for educators involved.

How deep is the chasm that has failed to provide an adequate vision for technology inclusion in America's schools? Kevin McGillivray (1996) pointed out: "Until now, technology integration in education has been piecemeal" (p.19). Riley, Kunin, Smith and Roberts (1996) noted that as pervasive as the use of technology has become, America's students are not connected. Though the hardware and software may be implemented, to what degree has it been it accessible to students, and how well are educators able to affect such connectivity? They noted that funding challenges were also a definite roadblock to technology access that was radically shifting the direction in education. Riley, Kunin, Smith and Roberts related three areas of concern. First, much of the computer technology within the schools was outdated, and a switch should be made to include far more computers with multimedia capabilities. Second, such implementation meant more training for teachers and maintenance personnel. Third, structural limitations were a severe problem for many schools. Of the three concerns noted, it becomes important to realize that researchers continue to validate professional development for the effective use of the implemented technology. Once the hardware and software have been implemented and structural limitations have been addressed, professional development in computer technology becomes the primary concern of researchers. Were this a perfect relationship, perhaps professional development would garner such respect. Unfortunately, so much attention and funding has been allocated to implementation and structural concerns that professional development for effective use of the implemented technology has taken a back seat.

A vision to incorporate computer technology from inception to the desired results should be required when introducing an innovation in education. Like Fullan and Pomfret (1977) and Hall and Loucks (1978), Hill (1999) noted a constant problem facing education when adapting to innovations: "Evolution, a process of change upon which our profession has relied, is failing to meet the demands of learners or society. The exponential growth of technology requires more rapid changes than evolutionary methods traditionally have provided" (p. 21). Hill suggested that as computer technology gains impetus in education and hardware and software are implemented, planning should precede that implementation. But, how is that possible given limited funding in order to do so? In the planning Hill suggested, professional development strategies should be an integral part. This was exactly the dilemma that Fullan and Pomfret and Hall and Loucks addressed in their studies to determine what constituted fidelity of implementation of an innovation. Such a vision for the educational innovation of computer technology should address these concerns. Presently, the process has focused too much on merely implementing the technology. Research needs to address how America's schools emphasize a vision that includes professional development strategies in regard to technology implementation. Such research must address more than the funding allocated for such development. It must also assess the degree to which educators feel successful utilizing the technology. That vision must include a process that provides attention to all aspects of computer technology implementation, from implementation, to professional development, to student success. Only then can the effective, planned use of the implemented technology be adequately addressed. If not, then the potential that the inclusion of computer technology in schools might offer may never be realized, and billions of dollars will have been wasted once again.

Computer Technology Inclusion and Professional Development

According to the literature, educational funding to implement computer hardware and software has been emphasized over the funding to direct such implementation toward effective use. A vision to provide adequate time, funding, and attention in order to prepare educators for the effective use of computer technology has created a significant challenge for legislators and educators. Billions of dollars have been allocated for such inclusion, and the funding continues. Trotter and Hoff (2002) noted that despite an eight percent decrease in educational technology funding for fiscal year 2003, the George W. Bush administration still proposed $722.5 million in funding. Such a monetary amount for education reflected the emphasis on technology. Despite what appeared to be a significant amount of monetary investment in technology, such inclusion has impacted educators in numerous ways that are not necessarily reflected in funding allocations. Researchers noted the disparity that existed between funding for the implementation of technology and funding that will affect its use, a disparity that deserved attention.

Until recently, the importance of the implementation of computer technology in America's schools has taken precedence over effectively training educators in its post-implementation usage. Researchers have begun to point out that a vision that included training for effective use after implementation may be just as important. Doherty and Orlofsky (2001) conducted a collaborative survey of 500 students in grades 7-12 as part of a national survey of technology use in the schools with Harris Interactive, Market Data Retrieval, and *Education Week.* The survey indicated that national spending on technology for schools reached $5.7 billion in 2000, certainly a significant technology investment. However, despite the expenditure for the infrastructure of hardware and software, the survey's findings suggested "that all of the nation's schools – whether rich or poor in technological resources – need to focus more attention on how to use their existing technology effectively in the classroom" (p. 45). Doherty and Orlofsky's survey statistics pointed out that the inclusion of computer technology in schools should be supplemented with the understanding of the importance of properly utilizing the implemented technology. McNabb, Hawkes, and Rouk (1999), Meyer (2001), Trotter (2002), and Trotter and Hoff (2002) indicated that priorities are shifting in regard to the attention being paid to the acquisition of hardware and software only, a shift that emphasized the importance of technology related professional development. Meyer remarked that teachers focused on this lack of professional development.

> So far, teachers say, schools aren't doing enough to fill that void. In a report last September from the National Center for Education Statistics, 'Teachers' Tools for

> the 21st Century,' 82 percent of the teachers said they were not given enough time outside their regular teaching duties to learn, practice, or plan how to use computers and other technologies. (p. 50)

When over four-fifths of educators felt that not enough time and money was being placed on development, a problem definitely existed. In other words, funding for hardware and software must be supplemented with funding for the professional development of educators implementing the changes computer technology fosters. That funding, should it come, must be tied to a vision that delineates a professional development strategy that includes constant training and revision. That funding should also be tied to data driven results specific to educators in districts across America. Schmoker (1996), reflecting on the importance of data to drive educational change, suggested: "even though goals positively influence improvement, few schools 'measure progress against both the ideal outcome and the actual baseline.' Such data promote conflict, revealing inconsistencies among teachers and between intent and actual events" (p. 33). Despite such conflict, this type of data needs to be assessed in order to provide adequate professional development strategies for effective technology use.

The literature reflected the importance of a relationship that should exist: Implementation of computer technology ought to be tied to the effective use of computer technology. The literature also continued to reflect on something much more subtle and important – that educators may not make this connection or are not provided the opportunity to make this connection. Both funding and time have been referred to as major obstacles in the training of educators in the effective use of computer technology. In a mixed methods study that examined pre-service and in-service teachers working toward their teaching credentials, Yildirim (2000) noted that the literature supported "the idea that the biggest obstacle to teachers using technology in their classrooms is the lack of adequate teacher training" (p. 1). Obviously, one of the major obstacles to such training was funding. It might be reemphasized that Vojtek and Vojtek (1997) reported findings from the Congressional Office of Technology and Assessment that indicated school districts spent 55 percent of their technology budget on hardware and 30 percent of their technology budget on software. This left a meager 15 percent of a district's technology budget for repairs and professional development. Zehr (1997), after consulting with educators that were not provided enough time for technology training, warned "that a lack of adequate teacher training – or of any teacher training at all – could mean that much of the money being spent on hardware and software is going to waste" (p. 24). Although a 1994 U.S. Department of Education (USDE) survey reflected that at least 15 percent of teachers in America had at least nine hours of technology training, Zehr also remarked that very little data existed on the percentage of educators who have received such training. More importantly, the USDE survey also reflected that 85 percent of teachers received less than nine hours of technology training. And, nine hours of technology training is a drop in the proverbial technological ocean. Zehr (1997) further noted that experts agree that 30 percent of a technology budget should be set aside for staff development, but like Vojtek and Vojtek (1997) she also noted the present percentage is actually about 15. Recognizing these barriers, unfortunately, appeared to be only a small step in solving the problems of technology inclusion in schools. A connection should be made between the implementation of computer technology and educators' use of the implemented technology in the classroom. Fullan (2001) in *Leading in a Culture of Change* noted the complexity involved in adapting to any innovation by its constituents whether in business or education. He noted that leadership and the inclusion of stakeholders involved in the innovation were important criteria for success. These, Fullan suggested, were best served by meaningful relationships. He also noted that those in leadership positions and the stakeholders involved in the implementation should be equal in importance. Both leaders and stakeholders must work in close harmony to ensure success. In the case of the implementation of computer technology, educator input into the professional development process for such inclusion was essential. So are educator concerns.

Despite the complexity inherent in providing professional development for technology inclusion and the usual lack of funding to do so, the success or failure of computer technology in education continues to be the responsibility of educators (Cybela, 1997; Fullan and Pomfret, 1977; Hall and Loucks, 1978, 1977; Hill, 1999; & McLaughlin, 1998). Fullan (2001) noted the relevance of relationships in order to effectively foster change and provide additional leaders. Relationships must also be exhibited in the inclusion of technology among legislators, administrators, teachers, and stakeholders and especially between administrators and teachers, as they work toward effectively implementing technology. Kagima and Hausafus (2001) commented that even though the implementation of technology was increasing, many barriers have been isolated that inhibit educators' ability to adopt these new technologies. They quoted Herring (1997) and Kelsey (1997) as identifying these barriers as " 'career concerns, lack of institutional support, fear of being replaced by the technology, and the lack of technological competence' " (pp. 33-34). When it came to the use of technology, such fears by educators provided researchers a strong connection to the importance of professional development programs to incorporate such technology. It also supported Schmoker's point that strategies to address these shortcomings be driven by data. State legislatures and local school districts that take into account a strong professional development strategy after having isolated the strategies to do so with data collection should have the best opportunity to effectively integrate computer technology into the curriculum. If state legislatures and local school districts fail to provide this professional development component effectively, then they do students, educators, administrators, and the taxpayer a disservice.

That the literature continued to emphasize professional development sent a clear signal to those entities responsible for successful implementation of computer technology. Chodorow (1998), Gifford (1999), Kagima and Hausafus (2001), Reynolds and Plucker (1999), Wolosoff (1998), and Yildirim (2000) all noted the importance of how computer technology was addressed after implementation might be more important than the acquisition of the technology itself. An important key isolated by researchers for the proper use of the implemented technology in America's schools was that implementation must be directly correlated to a technology vision that included a professional development strategy. Gilbert (2001) remarked that to "manage these new challenges effectively [effective use of the implemented technology], faculty members need a conceptual framework, taxonomy, set of labels, and an introduction to relevant models. They also need guided practice at using these new intellectual tools" (p. 22). In a qualitative study by Ertmer, Addison, and Lane (1999) that examined seven elementary teachers' beliefs about the role of technology in their classrooms, the authors corroborated Gilbert's and other researchers' concerns and quoted Cuban (1997) to reinforce conclusions garnered in their study.

> As with any professional development endeavor, it is critical that we 'know where we want to go, figure out how informational technologies will help us get there;...involve teachers deeply and continuously in on-site learning; hang in with them as the inevitable squalls of turmoil blow and recede; and finally, have patience, for such changes in belief and practice will take years.' (p. 10)

Researchers continued to validate that learning to cope with the changes created by adapting to an innovation requires an understanding that such adaptions involved a continual process, a process that required vision and attention to educators' needs at all their levels of concern and expertise. The term "continual" deserves explaining. Yildirim (2000) contended that teacher education programs should not only provide technology training, but such programs need to coordinate with local school districts to meet the technological needs of teachers. This coordination required constant reassessment. Beavers (2001) put this dilemma into perspective.

> School after school has learned the hard way that simply having computer equipment doesn't matter if teachers don't know how to use it. If the problem is that teachers don't know how to use the technology, the solution must be professional development, right? Of course. But conventional, intermittent staff development workshops that focus only on the mechanics of using computer technology are not the answer....Effective integration of technology into education calls for a new vision of professional development – not one that attempts merely to add technology to an established system but one that takes a fresh look at teaching and learning in general. Professional development composed of a few days of in-service workshops every year must be replaced by ongoing programs that are tied to your school's curriculum goals, designed with built in evaluation, and sustained by adequate financial and staff support. (p. 43)

Beavers (2001) certainly isolated a significant problem. Even if professional development for technology inclusion was provided, was it provided in something other than a piecemeal approach, with adequate funding, and with constant reassessment? Davis (1995) noted that even when school districts attempted to structure instructional technology into a technology plan, many of these plans failed to include continuing costs of upgrades and repair into the formula. What he also noted was the usual failure to relate the costs of computer technology clearly to its intended outcomes: productivity and curriculum. Beavers (2001), Davis (1995), Ertmer, Addison, and Lane (1999), Gilbert (2001), and McLaughlin (1998) elucidated on a continual concern, one of a vision that not only included technology implementation, but one that also addressed the relevance of professional development. Such a vision should be able to provide a solution to the following dilemma. Although professional development for technology inclusion has not been adequately funded, a question needed to be answered: Even if adequate funding was appropriated for staff development, would the money be used effectively? To do so would take the kind of planning Beavers, Ertmer, Addison, Lane, Gilbert, and McLaughlin suggested. If the vision and planning do not, the problem remains just as difficult for providing successful professional development as it has been for providing hardware and software without adequate funding for professional development.

If educators are to eventually make the transition from mere implementation of computer technology to a scenario where student achievement might be influenced by such implementation, should not attention be given to educators' understanding and comfort with the technology? In an attempt to correlate the relationship between staff development and student learning Guskey and Sparks (1996), pointed out the key ingredient in such a vision was professional development: "The effectiveness of staff development efforts must be considered throughout the staff development process, starting with the earliest planning activities" (p. 34). If such a course is given consideration, then the process becomes one of continual reassessment with all stakeholders involved in the process – students, educators, administrators, and the taxpayer through legislative representation. After coming to grips with infrastructure implementation, hardware and software implementation, continual updates for hardware and software, and the time and expense inherent in those processes, legislators and educators should provide just as much attention to the effective use of the technology after implementation. According to researchers, planned professional development with a vision that included the triumvirate of funding, time, and constant instruction provided the key to accomplishing that goal.

Wolosoff (1998) focused many researchers' concerns on the inclusion of technology and professional development in education. She specifically corroborated Beavers' (2001), Ertmer, Addison, and Lane's (1999), and Gilbert's (2001) concerns when she remarked: "As educators, we must constantly assess *what* we need, for *whom* we need it, *when* we need it and *why* we need it if we are to bring meaningful integration of technology into the curriculum. If we proceed haphazardly in our plans, we will achieve the physical accumulation of hardware and software without the warranted benefits" (p. 53). For Wolosoff, Beavers, Ertmer, Addison, and Lane, Gilbert, and McLaughlin (1998), proper planning, proper implementation of both the hardware and software, and a viable professional development component were key. The emphasis on professional development continued to reflect a growing concern among researchers and educators of the responsibility inherent in technology inclusion in the schools. For example, Ginsberg and McCormick (1998) compared computer use in what they determined 19 highly effective schools and 19 less effective schools and surveyed 1,163 teachers. They concluded that computers were not used in sophisticated ways in either of the two groups. In their conclusions and recommendations they noted: "the most disturbing finding relates to unrealized potential" (p. 4).

> Our recommendations for the future relate to the issues of 'out of sight, out of mind' and 'unrealized potential.' Teachers need to learn how computers can change

> their instruction. Along with improving the hardware and software for technology in schools, teachers need significant training and demonstrations to learn about the applications they are missing. (p. 5)

Moersch (1999) posed an important question that corroborated these researchers' concerns:

> How exactly can we quantify how teachers are using technology in the classroom and the general academic achievement that results from their instructional technology (IT) practices? As school systems nationwide plan their purchases of additional hardware, software, and related peripherals as well as their related staff development activities, information about each school's current IT practices is critical. Recent studies have found strong links among technology, academic achievement, staff development, and classroom instructional practices. (p. 40)

Moersch's case study isolated a school cluster in the Los Angeles Unified School District and had 120 respondents. The study suggested seven implications for staff development, and number six reflected the overall importance of technology professional development: "Make whatever staff development interventions are needed to increase staff members' confidence in using and troubleshooting personal computers" (p. 42). Like Moersch, Martin (1998), in a mixed methods study of the perceptions of 19 original state telementors, corroborated the importance of training and noted that the telementors recommended the support needed to implement technology. Martin concluded: "To develop an effective telecommunications program will require the district and school sites to commit adequate resources, provide ongoing training opportunities, allow easy access to hardware and software resources, maintain financial and personnel support, and facilitate the training of trainers from within the district" (p. 1,). The emphasis on professional development after computer technology inclusion was a constant in the literature. The literature reflected a constant emphasis on adequate funding, planning, time, and vision for educator professional development in order to effectively utilize the technology in America's schools.

Computer Technology Inclusion and Professional Development: Implications and Conclusions

Cybela (1997) focused on the key element for the inclusion of any technological innovation in the schools including computer technology. She focused distinctly on what other researchers have suggested as well, the responsibility of local administrators and educators for the transition that took place in education as technology continued to influence its direction. She indicated: regardless "whether the medium is satellite video conferencing, interactive television such as compressed video or two tin cans and a string, your role [the educator] is critical to help ensure that 'education,' not just 'information,' does indeed happen" (p. 1). Embedded in Cybela's statement was the importance of the process inherent in education, a process that was overwhelmingly controlled by teachers and administrators. Vjotek and Vjotek (1998) in an interview with Linda Roberts, director of the Office of Educational Technology and Special Advisor to the Secretary of the U.S. Department of Education, asked her to comment on the resources and help that her office could provide to staff developers and computer coordinators. She replied with three strategies. The first was isolated within the Office of Educational Technology itself, and the second involved communication with and help from the private sector.

> The third strategy has to be reaching out to teacher education programs and helping them develop strategies in the preservice, the in-service, and the outreach work that they do. If they are truly players in this arena, I don't think they have any choice. Every teacher education program in the United States must make sure teachers have

> technology in their toolbox when they begin teaching. I cannot envision quality teacher education programs that would not integrate technology into their professional development program. (p. 3)

Certainly, Roberts placed specific attention on technological preparation even prior to actual employment within a school. Farmer (1999) noted that the California Commission on Teacher Credentialing mandated that after January 1, 2000 teachers entering the system must show proficient use of computer technology. They further mandated that to garner professional credentials, teachers would have to exhibit advanced computer skills. Farmer's example reflected that change was definitely in the wind as far as state mandates to provide the public meaningful data to support its investment in technology. Mandates like the one provided by Farmer were further indications where the success or failure of technology inclusion lay. As such, the importance of professional development became crystal clear. Otherwise, the fears teachers had about technology that Kagima and Hausafus (2001) elucidated – career concerns, lack of support, lack of technological confidence, and actually being replaced by the technology - will continue to hinder administrators and educators in their efforts to effectively incorporate technology into classrooms. The lack of educator professional development with the implementation of computer technology continued to be problematic for educators as it appeared to always have been.

Thornburg (1991) observed: "Even at this late stage of development, classroom computers are still seen only as boxes to run fixed applications, rather than as vehicles with which we can extend and expand our thinking" (p.13). Eleven years ago, Thornburg noted that the problems associated with computer technology in education went beyond the acquisition of hardware and software and focused directly on the responsibility of the educator. He commented that, "Educators should model domains of knowledge as 'conceptual space' in which learners can build their own maps and conduct their own explorations" (p.108). That is a difficult process, especially if a teacher knows little about the technology being employed in the room. As researchers have noted, attention to professional development is key. However, funding for such development has not been adequate and remains extremely important. Madden (1997) suggested that early enthusiasm for technology use in the schools easily dissipated because support was not adequately provided to a staff after the implementation phase. She stated: "Too little thought is given to maintaining a school environment that nourishes the initiative. For benefits to be sustainable, well planned staff development" (p. 56) must be maintained after technology use has been implemented. In a quantitative study structured to help superintendents and administrators determine resources and training needs, Mathews and Guarino (2000) recommended that "there is a need for staff development and training..." (p. 4). Their study surveyed 3000 teachers, and they concluded that "between 1/3 and 1/2 of the teachers never used computer technology for any instructional purposes" (p. 3) although their [technology instructional purposes] availability existed. This was exactly the problem that Madden (1997) and other researchers noted. Attention must be paid to professional development after the technology has been implemented. Technological nourishment must be a continual process.

The literature made it quite clear that problems were still considerable with technology implementation in the schools. Riley, Kunin, Smith and Roberts (1996) related three important areas of concern with technology inclusion in the schools. First, much of the computer technology within the schools becomes outdated soon after implementation. Second, such implementation means more training for teachers and maintenance personnel. Third, structural limitations are a severe problem for many schools. Of the three concerns noted, two continue to deal with implementation and maintenance. It becomes important to realize that researchers continued to validate professional development once the hardware and software were implemented. Given this constant emphasis in the literature, where has been the funding to provide such professional development? Earnest (2001) in a quantitative study that garnered responses that pertained to staff development and funding from 133 public school superintendents in Virginia noted several vital statistics from these administrators. Eighty-five of the 133 surveys were returned, and the data reflected that "More than 84 percent of the superintendents believed that additional funding for teacher training in technology would make a difference in improving teacher preparation, and about 82 percent felt that more funding would improve school outcomes" (p. 1). McKenzie (1998) perhaps focused the attention researchers were directing toward professional development and technology when she noted: "After two decades of effort and billions of dollars, computers and new technologies remain peripheral (read 'tangential' or 'irrelevant') to life in the typical American classroom" (p. 6), a problem McKenzie referred to as the screensaver disease. Her solution to this lack of efficient use of technology in the schools led directly to professional development. McKenzie suggested: "Staff development is the single best insurance policy against the screensaver disease.... This challenge is not about learning. If we expect teachers to turn around and use technologies daily with students, they need to discover personally the power of the new technologies when combined with rich information" (p. 9). Her suggestion certainly called for funding, planning, time, and vision. McKenzie (1998) noted that as computer hardware and software are implemented, planning should precede that implementation. In that planning, professional development strategies should play an integral part.

Moore (2001) pointed out that the process Hill (1999), McKenzie (1998) and other researchers suggested is not an easy one. In a study titled *Taking Stock of Teacher Technology Use,* Moore began with the obvious concerns researchers have elucidated:

> How can teachers know the district's expectations for technology use? How do district administrators know teachers are using technology in the classroom? How can they be sure technology is being used with effective instructional practices? How can staff development specialists determine the most needed and desired technology skills for teachers? Despite billions of dollars of investment in technology year after year, many schools can only guess at the answers to these important questions. (p. 26)

Moore, like Schmoker (1996), understood the importance of data in decision making for technology inclusion. This is exactly where the Blue Valley School District in Overland Park, Kansas began. With a $40 million investment in technology, Moore, someone who had worked with educational technology for 13 years, and the district took the initiative to find the answers. One very important answer that evolved was that the district had never specifically articulated how they expected teachers to utilize the implemented technology. From that basic premise, and with teachers the focal point of their initial endeavors, Moore and the district developed 43 competencies in four areas: curriculum and instruction, classroom management, communications, and professional development. Moore and Blue Valley School District teachers and administrators were able to generate data that reflected a vision that provided funding, time, and planning. Theirs was a vision that began at the administrative level and was directed to educators in the district, as accumulated data drove administrative decisions to direct district educators in computer technology professional development. However, such a direction, as successful as it was, is not the only way to accomplish the goal.

Putnam City High School in Putnam City Oklahoma recently began a grass roots movement within their building to begin utilizing existing technology more effectively and employ recently purchased palm pilots in an effort to coordinate teachers and planning more effectively (Migliorino, 2002). The building technology director and an assistant principal noted that faculty involvement in the project was enhanced because of administrator support. Fifty-five palm pilots were purchased for administrator and teacher communication and planning that included networking and cross curriculum teaching. With technology materials supplied and administrator support, teachers began utilizing planning periods to take advantage of palm training. Technology use in the classroom increased also with Microsoft PowerPoint being utilized. The grass roots vision included creating classroom sets of palm pilots for student checkout and use with keyboards, software, and graphing calculators included. A technologically centered school, Putnam City High School began to shape its own technology future that included all the stakeholders in their vision. Goldberg (2002) noted that such a direction taken by administrators and faculty at Putnam City High School was exactly the direction needed. "To have a truly transformational impact on education, technology must become ubiquitous. It must be always available, mobile, and flexible. It must be intuitive, reliable, and user-friendly to the point of being no more difficult to operate than a chalkboard, textbook, or overhead projector. It must be seamless and nearly invisible" (p. 32). Technology must be like an appendage moving without a whisper of a thought. Both the Blue Valley School District in Kansas and Putnam City High School in Oklahoma were leaning toward this seamless direction by including the stakeholders involved in the process. Although both have instituted different directions, both have accomplished a measure of success in effectively incorporating computer technology.

Such technology inclusion success stories should be the rule and not the exception. To accomplish such success meant including all the stakeholders in the process as the Blue Valley School District and Putnam City High School did. Sparks and Hirsh (1997) quoted Darling-Hammond and McLaughlin (1995) about the success of any agenda or innovation in education and the importance of professional development:

> The success of this agenda ultimately turns on teachers' success in accomplishing the serious and difficult tasks of learning the skills and perspectives assumed by new visions of practice and unlearning the practices and beliefs about students and instruction that have dominated their professional lives to date. Yet few occasions and little support for such professional development exist in teachers' environments (p. 3).

Certainly, a new innovation for education has been implemented, and yet the agenda that should have led to its effective use, like Darling-Hammond and McLaughlin suggested, has not included enough emphasis on the professional development of teachers. Such a lack of vision lay with all involved. As researchers have noted, the ultimate responsibility for the success of technology inclusion in the schools lay with educators. This responsibility becomes even more difficult given the complexity inherent in the implementation of computer technology. Fullan and Pomfret (1977), Hall and Loucks (1978, 1977), Herring (1999), and Mills (1997) noted that when change occurs, educator concerns increased. Herring sourced Fullan (1985): "It is clear from research that the concerns of teachers are heightened even more when change is involved. This seems to be even more so when the proposed change is of a technological nature. Depending on the individual, the concerns may be in different areas" (p. 55). Her comment noted directly the importance of determining teacher concerns and attitudes when developing professional development strategies. It is one thing to implement computer technology, but it is incorrect to assume that all educators will be at a similar level of expertise with that implemented technology. As such, it becomes extremely important to first determine teacher concerns about an innovation in order to effectively develop professional development strategies for them.

Lumping educators with differing concerns and differing degrees of concern in a one size fits all professional development session may cause more harm than good. Mills (1997), in a study that addressed integrated learning systems (ILSs) for computer-based instruction (CBI), noted that the educational context of the innovation was the most important aspect of its effective use. For Mills, "To understand the impact of ILS technology in the classrooms, it becomes necessary to shift from the technology to the people who use it" (p. 51) was the key. Similarly, in order to address the implementation of computer technology, a shift should be made to recognize the importance of the educator as well. Given the nature of the existing lack of funding, time, planning, vision, and adequate professional development, this becomes an arduous responsibility. Even though his emphasis was not specifically on professional development for technology, Wood (1989), a pioneer of the importance of professional development could not have put it better. Given Fullan and Pomfret's (1997) and Hall and Louck's (1978) fidelity of implementation concerns for educational innovations, Wood hit the fidelity nail on its head. "No significant improvement in administration, teaching, or school programs can occur without staff development. Conversely, staff development is aimless and ineffective without clearly identified improvement goals aimed at increasing school effectiveness" (p. 27). From the bottom up to the top down, Wood clearly identified the importance of the stakeholders and the direction when implementing changes in education. Any changes must come with attention to professional development. He certainly corroborated Hord, Rutherford, Huling-Austin and Hall's (1987) ideas to include everyone involved in the process. Certainly, a new model has emerged in all facets of life, one that has been difficult to fence because it is constantly changing and rearranging how and why business, government, and education function. Will this influence be well managed in education? Hord, Rutherford, Huling-Austin and Hall's seminal research into adaption to innovations should persuade government, business, and education to pay attention to the importance of the most important change agent in any process or innovation: the individual. In the case of computer technology implementation in education, researchers have isolated the educator as the point of reference for the wise use of the implemented technology.

Educator Concerns about Computer Technology Inclusion/ Strategies for Computer Technology Use: Change Theory and Adult Education

Change Theory

In their foreword for *Taking Charge of Change*, Hord, Rutherford, Huling-Austin, and Hall (1987) noted an unfortunate, perhaps even a systemic problem inherent in education – the frustration inherent in attempting to change the status quo. They mentioned several innovations that rapidly fell by the wayside after implementation: open classrooms, team teaching, educational television, new math, and inquiry-oriented science. These innovations are employed even today. However, the broad appeal each may have offered never bore fruition. Hord, Rutherford, Huling-Austin, and Hall questioned why such innovations did not remain viable within the education community. They asked a very reasonable question that pertained to these innovations' failure and provided an interesting observation as well.

> But, did these innovations fail because the concepts and processes were faulty? Or because they were never properly implemented? We will never know. Evaluations of innovations have usually focused on the assessment of their effectiveness. This type of assessment, without an examination of how the innovation was implemented, leads to distorted results. One of the most serious mistakes made by both the administrators [those that administer the innovation] and leaders of a change process is to presume that once an innovation has been introduced and initial training has been completed the intended users will put the innovation in practice. A second serious mistake is to assume that all users of the implementation will react in similar ways. (p. v)

Without a vision for implementation that included assessment and reassessment of the innovation, how could anything of value as a result of the innovation be determined? Perhaps more important was their reference to the assumption that all educators would respond equally to the innovation. Hall, George, and Rutherford (1998) noted: "Personalized interventions can facilitate change, but, in the end, each individual determines for herself or himself whether or not change will occur" (p. 8). No doubt, change is difficult. However, should this idea of recognizing individual circumstances not be taken into consideration when an innovation is implemented, surely problems may arise with the successful use of an innovation. Herring (1999) referred to Fullan and Miles (1992) recognition that true change is only possible when individuals take specific action to alter their behavior. Given the complexity of computer technology implementation, these researchers pointed to the importance of educator concerns and professional development strategies as they related to computer technology implementation and effective use.

Continual references to the importance of the individual working with the changes that innovations fostered in education have been a constant in the literature, especially when considering technology professional development strategies. Provided that relevance, it appeared important to include educators who control the use of the innovation in the process to determine effective ways to employ the innovation. A first step in such a process would be to determine an educator's level of concern toward the innovation in an effort to design effective professional development programs for that innovation's effective use. Gershner and Snider (1999) noted: "the problem on local, national, and international levels is to use technology as a tool for learning within meaningful contexts to support learning" (p. 2). With that problem isolated, they also noted that change is not static, but rather a dynamic process. It is a process where the attitudes and the concerns of the individual toward the innovation must be taken into consideration. Herring (1999) cited Maney (1994) and corroborated Gersner and Snider's contention. Herring noted research reflected that when an individual's attitude and concern toward an innovation were considered, changes were more successful. It appeared logical to assume that when educators participated in an innovation's direction from the onset, such change would be more successful, and those individuals more content. Fullan and Pomfret (1977) in a detailed literature review titled *Research on Curriculum and Instruction Implementation* concluded that the implementation of an innovation was extremely complex because it involved a variety of individuals in varying positions within a given hierarchy and not just the innovation itself. They noted:

> If there is one finding that stands out in our review, it is that effective implementation of social innovations requires time, personal interaction and contacts, in-service training, and other forms of people based support. Research has shown time and time again that there is no substitute for the primacy of personal contact among implementers, and between implementers and planners/consultants, if the difficult process of unlearning old roles and learning new ones is to occur. Equally clear is the absence of such opportunities on a regular basis during the planning and implementation of most innovations. All of this means that new approaches to educational change should include longer time perspectives, more small-scale intensive projects, more resources, time, and mechanisms for contact among would-be implementers at both the initiation or adoption stages, and especially during implementation. Providing these resources may not be politically and financially feasible in many situations, but there is no question that effective implementation will not occur without them. (pp. 391-392)

Theirs was an insightful description into the apparent failure of so many educational innovations and their implementation, and it reflected the literature's emphasis that politics, finances, and planning were constant influences in regards to those innovations. Fullan (1993) reiterated the importance of these criteria. He isolated eight lessons of change while updating an approach toward innovations:

1. You can't mandate what matters.
1. Change is a journey, not a blueprint.
1. Problems are our friends.
1. Vision and strategic planning come later.
1. Individualism and collectivism must have equal power.

1. Neither centralization nor decentralization works.

1. Connection with the wider environment is critical for success. [and]

1. Every person is a change agent. (pp. 125-130)

Each of the above lessons except number four corroborated Fullan and Pomfrets (1997) initial consideration about innovations in education. But, even lesson number four that relates to vision and strategic planning does when noting what Fullan meant. Planning should precede an innovation, and long term planning should be included for sure. Fullan made a distinction in order to help those involved in the process of change in adapting to an innovation, one that reiterated the complexity inherent in adapting to change.

> First, under conditions of dynamic complexity, people need a good deal of reflective experience before they can form a plausible vision.... Second, shared vision, which is essential for success, must evolve through the dynamic interaction of organizational members and leaders.... The critical question is not whether visions are important, but how they can be shaped and reshaped, given the complexity of change. (p. 127)

Fullan and Pomfret (1977) suggested a process that began with an end in mind prior to implementation and one that included connections between and among the individuals implementing the innovation and the individuals planning and consulting. Some 15 years later, Fullan (1993) provided deeper insight into the process and complexity of change when adapting to an innovation. He continued to note that time, resources, and the commitment between all the stakeholders involved in the process should be included if an innovation has the possibility of success. Unfortunately, this type of insight has received little attention beyond the literature. Both lack of funding and lack of planning, much less reshaped visions over time, have contributed to that limited attention. In the new millennium, implementation still takes precedence, and it has been implementation that does not include the vision Fullan and Pomfret suggested.

Hall and Hord (2001) corroborated researchers contentions that attention to change theory was an important one when adopting such a complex innovation as computer technology. After contributing to the initial theory on change research, Hall and Hord have noted that their long-term collaborative research into change theory has finally evolved into "a series of principles that will hold true for all cases" (p. 4). These principles supported Fullan's (1993) contentions about change also.

Change principle 1: Change is a process, not an event;

Change principle 2: There are significant differences in what is entailed in development and implementation of an innovation;

Change principle 3: An organization does not change until the individuals within it change;

Change principle 4: Innovations come in different sizes;

Change principle 5: Interventions are the actions and events that are key to the success of the change process;

Change principle 6: Although both top-down and bottom-up change can work, a horizontal perspective is best;

Change principle 7: Administrator leadership is essential to long-term change success;

Change principle 8: Mandates can work;

Change principle 9: The school is the primary unit for change;

Change principle 10: Facilitating change is a team effort;

Change principle 11: Appropriate interventions reduce the challenges of change; [and]

Change principle 12: The context of the school influences the process of change. (pp. 4-16)

It would behoove districts to make the best use of the technology implemented. And, according to researchers, the place to begin is with the educators implementing computer technology. The common focal point and starting place to create the effective use of the implemented technology is with the change agent, in this case the educator, and with an understanding of change theory and more recently these twelve principles of change.

Change theory and the influence of the change agent in fostering the success of an implemented innovation in education have been effectively addressed in the Concerns Based Adoption Model (CBAM). Hall, George, and Rutherford (1998) credit the CBAM and its eventual concerns' instrument, the SoCQ, to the initial concerns research done by Frances Fuller with teachers concerned about their teaching. The concerns expressed by educators toward innovations were similar to Fuller's findings. Hall, George, and Rutherford noted: "in time Seven Stages of Concern About the Innovation (SoCQ) were identified. Stages of Concern About the Innovation then served as one of two basic dimensions for describing the dynamics of an individual innovation adopter" (p. 4). The study of change has been well established with the CBAM, and twenty years of research have validated the use of the SoCQ, the questionnaire used to isolate the seven stages of concern about an innovation. The SoCQ can provide a first step toward determining future professional development strategies and initial data for a district to determine a vision toward the proper use of an implemented innovation as it places at the forefront what researchers have pointed to as most important: the educator.

Adult Education

Change in education through the inclusion of innovations has been a constant. According to the literature, just as important as any educational innovation introduced was that the effectiveness of the implemented innovation has rested squarely on the shoulders of educators. The implementation of computer technology has fostered the same conclusion. The literature also noted the importance of professional development in providing educators the time, planning, and vision necessary to institute any innovation effectively. Such professional development must be tied to research and the data generated by such research. For example, researchers reflected the importance of change theory as a predominant influence in adequately addressing how to effectively prepare educators for innovation inclusion, especially for such a demanding innovation as computer technology (Fullan, 2001; Fullan & Pomfret,1977; Hall & Hord, 2001; Hord, Rutherford, Huling-Austin, & Hall, 1987).

The theory, coupled with generated data, should create the circumstances by which an innovation might be effectively implemented. The key was the educator. Provided the conclusion that the individual was of the utmost importance in the process of effectively implementing an innovation, it became important to address adult learning theory as well. Houle (1980) certainly placed this idea into perspective as he noted the characteristics of a profession continually revolve around the importance of the individual. In chapter ten of *Continuing Learning in the Professions* he emphatically stated:

> *The primary responsibility for learning should rest on the individual.* It is the ideal of every profession, stated or implied in its code of ethics, that each professional should feel a deep and continuing concern that his or her own education be carried

> out at a high level throughout a lifetime of practice. To be sure, all people have a similar need if they are to fulfill their potentialities, but professionals must feel it with special urgency.... (pp. 305-306)

Continuing education, especially for professionals, was considered essential. Such continuing education, however, especially in the profession of education, should be coupled with meaningful professional development strategies. Since change is a constant, and innovations are continually introduced, it behooves school districts to understand just how adults learn as they attempt to incorporate professional development strategies for implemented innovations. Houle (1972), in discussing the credos and systems that create organizations and professions, noted that in order to improve any given circumstance within an organization or profession, only two questions need be asked: "What forces are at work to increase the level of performance? What forces operate to keep it from rising higher" (p. 18)? He also noted the complexity inherent in the answers to those questions while again placing an innovation's success in education exactly where all other researchers had. "The entire career of the educator is judged by some balancing act of the relative success and failures of all the programs he designs and conducts" (p. 34). Such responsibility and balancing required continuing education for educators, especially when it came to adapting to implemented innovations. That some innovations were more complex than others required even greater attention to continuing education.

To assess the concerns that educators have in regard to implemented innovations was relegated importance in the literature. If school districts pay attention to planning and to a vision that addresses educator's concerns, such assessment could help devise and direct professional development strategies toward the effective use of the innovation. Included in such planning and vision, however, must be strategies that reflect how adults learn.

Brookfield (1990) indicated that his beliefs about teaching resulted from both his excitement and frustration as a learner. The key in this admission was the phrase "as a learner" and not a teacher. He continued that his successful teaching had been modeled on successful learning situations. How important is it to create the circumstances for successful learning? Perhaps Brookfield just provided the answer. Educators should be provided the opportunity for continued professional development and continued learning experiences, and these opportunities must take into account the complexity of the implemented innovation and the complexity involved in continuing education for adult learners.

> But, another approach to faculty development is just as valuable.... Unfortunately, it has generally been neglected. This approach is, quite simply, to ask teachers to experience learning.... In particular, to ask them to try to learn something new and difficult, to reflect on how this feels, and then to interpret what this means for their own teaching. In the first stage of this process, teachers are released from part of their normal duties to learn something that is unfamiliar and intimidating to them. As they experience this process they recognize their emotional peaks and troughs. They note those times they feel threatened and those times they feel exhilarated. They identify those teacher actions that encourage and affirm them and those that intimidate and infantilize them. They observe what enhances their learning and what hinders it. (p. 41)

As a result, educators reflected on these experiences. Key to Brookfield's emphasis about how such learning and reflection take place was the opportunity for the educator to provide needed input into the process of learning. Such input was exactly the concern of the CBAM and the SoCQ in regard to the implementation of an innovation. Both adult learning theory and change theory suggested similar directions to ensure the most important criterion in adapting to an innovation – the individual – is considered.

Such awareness of an individual's contribution to help foster strategies to the problems created by change in education and to adapt to innovations in education is a preliminary step. Cross (1981) noted that just as important as to why adults continue to participate in learning activities beyond traditional schooling was why they did not. Perhaps this insight may help to shed light on the current situation with computer technology implementation in America's schools. She indicated adult learners "deter…from participating in adult learning activities" (p. 98) because of obstacles defined by her as "situational, institutional, and dispositional barriers" (p. 98). These three areas provided insight into how professional development strategies should be formulated for educators as they attempt to implement innovations in education. In regard to the implementation of computer technology and its effective use, Cross noted situational barriers like time and outside responsibilities might hinder an educator's ability to train to use the implemented innovation. These barriers lay outside the purview of the profession itself. Institutional barriers were inadequacies within the organization itself and lay within the confines of the profession. In this specific study, the implementation of computer technology without adequate preparation for educators to effectively implement the technology provided the greatest barrier. Just as important as these two external barriers were dispositional barriers. These were specific and internal psychological influences that directed the individual to choose. Such barriers included, as Kagima and Hausafus (2001) noted, " 'career concerns, lack of institutional support, fear of being replaced by the technology, and the lack of technological competence' " (pp. 33-34). Professional development that includes an understanding of both change theory and adult learning theory becomes essential in developing strategies for the effective use of any educational innovation, especially one as complex as computer technology.

Cross (1981) elucidated further on the relevance of identifying and confronting these barriers to adult learning by noting the importance of individual internal psychological motivations as they related to continuing education. She indicated that such emphasis on internal motivation has been relegated more to psychology, whereas attention to external motivation has been relegated more to the study of lifelong learning. Her view is that both are important, and that the internal motivations of adults must also be considered in the pursuit to help adults continue to grow through continuing education. Her research led her to formulate what she termed as the Chain of Response (COR) Model in an attempt to isolate the variables that were influential in an adult's decision to continue learning or not. She noted the most important consideration in this regard was to recognize that these variables were interactive and not sequential.

> This conception of behavior as a constantly flowing stream rather than a series of discrete events is consistent with the 'radical theoretical revision' now taking place in the psychology of motivation. 'The problem for motivation,' say DeCharms and Muir in their 1978 review of motivational psychology (p. 93), 'is to understand the determinants of change in the stream of action, not to find what drives impel specific behaviors.' (p. 125)

Such focus certainly will require a great deal of study in order to determine individual internal and external motivations in regard to computer technology implementation, but such attempts should be made because both internal and external barriers need to be identified. Cross (1981) emphasized that "The continuum implied in the...[COR Model]...indicates that forces for participation in adult learning activities begin with the individual and move to increasingly external conditions – although it must be generally understood that, in any interaction situation, forces flow in both directions" (p. 125). The first step, according to Cross, was to begin with insight into self understanding and education, the beginning of the model, and was an obvious attempt to address the psychological motivations and educational experiences that have been influential in an individual's involvement in learning. Such reflective analysis according to Brookfield (1990) was essential. Schon (1987) noted that such reflective analysis by individuals should allow for better guidance by the teacher toward the desired outcomes because the individual has participated in the process. Mezirow (1991) referred to this as individual or group assessment of needs and interests and noted its importance in determining anticipated outcomes. Time, planning, and vision to acquire such assessments must also fit within such a structure. Perhaps Mezirow summed the importance of such directions in adult learning: "The goal of adult education is to help adult learners become more critically reflective, participate more fully and freely in rational discourse and action, and advance developmentally by moving toward meaning perspectives that are more inclusive, discriminating, permeable, and integrative of experience" (pp. 224-225). It was Houle's student and also a seminal researcher in adult education, Malcolm Knowles (1992), who coalesced these specific adult researchers' concerns when it came to the implementation of educational innovations in general:

> My foundational principle of adult learning in making presentations is that the learners be active participants in a process of inquiry, rather than passively receive transmitted content. A second principle is that the process should start with and build on the backgrounds, needs interest, problems, and concerns of the participants. My experience is that when people have the opportunity to learn by taking some initiative and perceiving the learning in the context of their own life

situations, they will internalize more quickly, retain more permanently, and apply more confidently (p. 11).

Conclusion

Researchers, theorists, and educators constantly pointed to the importance of the individual in effectively utilizing and disseminating the innovations implemented in education. They also noted the importance of change theory and adult learning in order to provide educators the opportunity to foster such success. Numerous variables contributed to educator success in regard to their effective use of educational innovations and to their ability to pass such effective use to their students. Such a detailed emphasis should provide educators with a blueprint as they attempt to effectively implement an innovation. If such advice is not heeded, then it will be business as usual. Time and money will continue to be invested without planning and vision to generate an innovation's effective use. Hord and Hall (1984) placed such responsibility on those in leadership positions. They noted that the principal is the person in such a position of responsibility to foster the necessary steps to create positive change toward the effective use of an implemented innovation in education. Their suggestions lead one directly to the CBAM and SoCQ as a model and an instrument in determining educator concerns toward an innovation, and in the case of this study, the implementation of computer technology. Wiswell (1995), in a review of Knowles *Human Resources Development with Malcolm Knowles*, noted Knowles concern with both continuous change and the needed "focus on interpersonal interaction...in the workplace" (p. 6). "He [Knowles] discusses his views of the current role of the trainer that, in the face of the increasing influence of educational technology, is changing from transmitter of knowledge to dependent learners to facilitator, and resource person for increasingly self-directed learners" (p. 6). Here, Wiswell indicated Knowles noted the change that the inclusion of technology in education and life in general has created for educators in and out of the profession of education. He also noted the importance that Knowles placed on both human resource development and adult education. Such an emphasis on human resource development and how to effectively provide the circumstances for continuing education cannot be ignored, and such emphasis must be given adequate reflection among those instituting such changes.

Chapter III

METHODOLOGY AND PROCEDURES

Introduction

The literature reflected that the emphasis for the implementation of computer technology has thus far taken precedence over the emphasis to effectively train educators in its use and connect such use to curriculum (McNabb, Hawkes, & Rouk, 1999; Wear, 2002). The literature also reflected that attention has begun to shift toward the relevance of such training for educators. Despite that shift, funding, time, planning, and vision that addressed all aspects of the implementation of computer technology have been rare. The distance between the implementation of the technology and its effective use with educators and students continues to be inadequately assessed. Funding to supply computer hardware and software in such a constantly demanding profession to prepare educators for such changes in emphasis has been difficult. Just as difficult, however, has been the ability to provide adequate time and attention to professional development strategies for educators in order to prepare them for the desired use of the implemented technology. To accomplish this, the literature recommended a shift toward data driven educational reform. Slavin (2002) indicated that Congress appropriated $150 million... "to adopt 'proven, comprehensive reform models' " (p. 15). This financial investment in data driven assessment of computer technology implementation pointed toward the future for continued support of such an investment. Nevertheless, financial investment in such an expensive educational innovation as the implementation of computer technology required such attention.

Researchers indicated that the attention to computer technology implementation should shift from piecemeal efforts that pay attention to only certain aspects of implementation to one that will include all aspects of the implementation of this innovation from its inception to the desired results (Doherty & Orlofsky, 2001). With the investment in technology inclusion in America's schools, concerns that relate to the effective use of computer technology are pressing, and research is needed to direct the effective use of the technology in an attempt to justify the expense of implementation. Emphasis on technology in schools has definitely impacted educators, and researchers have noted the disparity that exists between the implementation of technology and its effective use, a disparity that demands attention. Designing curricula in education that utilize implemented computer technology will be a constant challenge. Just as important was the contention in the literature that the success of the utilization of computer technology in education lay in professional development strategies that included computer technology training for educators. Such strategies should provide a vision based on data collection and long range planning goals that express the desired results of such implementation. To begin, data that take into account educator concerns about technology, educator concerns about innovations and change, and educator concerns that relate to continual learning must be considered.

Researchers noted that when change occurs, educator concerns increase (Fullan & Pomfret, 1977; Hall & Loucks, 1978; 1977; Herring, 1999; Mills, 1999). Similarly, in order to address the changes that the implementation of computer technology have created in education and to determine professional development strategies to foster the effective use of the technology, educator concerns must be identified and addressed (Migliorino, 2002). This continues to be viewed as an essential first step in adequately addressing the problems that exist with the implementation of computer technology in America's schools. Researchers have noted that it is just as important to develop strategies that do not lump educators with differing concerns and differing degrees of concerns in a one size fits all professional development session. Such a narrow direction to professional development and the implementation of computer technology, as the literature noted, may do more harm than good.

Research Design

Researchers indicated that the use of computer technology in public schools might be more important than the acquisition of the computer technology itself (Chodorow, 1998; Gifford, 1999; Reynolds & Plucker, 1999; & Wolosoff, 1998). The importance of a professional development component that focused on educator concerns with such inclusion was also noted (Gifford, 1999; Wolosoff, 1998). The research questions for this study with one southwestern Oklahoma school district provided insight into technology inclusion in the district and the levels of concern educators had about such inclusion. It was hoped that answers to the research questions would provide data and insight for the development of better professional development strategies for district educators.

This study used both analysis of existing district data and quantitative methods of investigation to obtain information about the district's directions toward the implementation of computer technology during FYs 1999-2001. The investigation provided specific information about the district's professional development strategies in computer technology and allowed for insight into the district's emphasis on effectively implementing computer technology. First, district budgets and expenditures were examined to determine monetary allocation for professional development and specifically computer technology training. The district's technology plan was also examined to determine if a technology vision that included time, planning, and funding for professional development strategies in computer technology had been included. District administrators in positions to provide information and direction for the study were contacted for materials to supplement data provided by the district. Second, administrator and faculty responses from each of the district's schools were obtained to determine educator levels of concern toward computer technology implementation. The Stages of Concern questionnaire (SoCQ) (Hord, Rutherford, Huling-Austin, & Hall, 1987) was used to measure the degree of concern that teachers and administrators had toward computer technology implementation.

The research questions structured for the study related to the perusal of the district's overall budgets, the district's professional development budgets, the district's technology plans, its professional development trainings that specifically related to computer technology, and its educator levels of concern during FYs 1999-2001. They were:

1. What (if any) was the percentage of funding in the district devoted to professional development toward computer technology training?
2. How much time (if any) was provided to teachers and administrators to enhance their computer technology skills in the professional development strategy?
3. What were the district's plans (if any) for a staff development strategy that incorporated computer technology?
    - Were there follow-up procedures that included long-range training in computer technology?
    - Did the district channel its resources and train to the various levels of abilities among its staff (i.e. novice, intermediate, advanced)?
4. What kind of computer technology training (if any) was being implemented?
    - Was the training for administrative purposes?
    - Was the training for classroom integration?

- If both training for administrative purposes and training for classroom integration were focused on, which was done first and why?

5. What were educator levels of concern as they related to the implementation of computer technology?

Participants

The southwestern Oklahoma school district was selected based on its willingness to participate in a collaborative study to determine educator concerns about computer technology implementation in order to address future professional development strategies toward computer technology implementation. All 37 elementary and secondary schools and district administrative offices had implemented computer technology to some degree. The district had a student population of 16,990 students as indicated by local fiscal data (Statistical Profile, 2001). Table 3.1 reflects the district's free and reduced lunch program.

Table 3.1: District Free and Reduced Lunch Program (FRLP)

Fiscal Year	Total Members	FRLP Membership	Percentage
FY 99-00	17,116	9585	56
FY 00-01	16,608	9300	56
FY01-02	16,103	8857	

(A. Kaigler, personal communication, December 10, 2002)

Table 3.2 reflects district student membership, ethnicity, and the average daily attendance.

Table 3.2: District Student Membership, Ethnicity, and Attendance

Total Membership	16,990	Percent
Elementary Membership	10,110	60
Secondary Membership	6,880	40
Hispanic	1,542	9.08
Black	5,331	31.38
Amer. Indian/Alaskan	1,085	6.39
Asian American	380	2.24
White or Other	8,652	50.92
Average Daily Membership	16,316	96
Total Special Education	2,331	14

(Statistical Profile, 2001)

Table 3.3 (page 78) reflects general district information. Important to note are the pupil to teacher ratio for elementary and secondary schools. These are deceivingly small as counselors and administrators in each building are figured in the overall equation. However, such numbers made it extremely difficult for educators to adequately utilize the existing computer technology, especially given that teachers have one computer per class on the average or limited lab time if the school has chosen to place computers in a lab setting.

Table 3.3: General District Information

	District Numbers	Percent
Total Certified Membership	1310	
Regular Ed Teachers	984	75
Special Ed Teachers	129	10
Administrators	98	7.4
Other	99	7.6
Elementary Classrooms	549 of 1113	49
Secondary Classrooms	564 of 1113	51
Salaries, All Areas	$64,517,538	
Average Sal., All Certified	$38,753	
Avg. Classroom Ed. Sal.	37,168	
Avg. Years Experience	10.57	
Elementary Pupil/Ed. Ratio	18.27	
Secondary Pupil/Ed. Ratio	12.20	

(Statistical Profile, 2001)

At the time of the study, the district housed 30 elementary schools, four junior high schools, and three high schools. The average per pupil expenditure for FYs 1999-2001 isolated in the study was: $4956.06 in FY 1999, $5304.66 in FY 2000, and $5276.03 in FY 2001 (Branstetter, 2002). Administrators and teachers in the district's 37 schools and district administrative personnel were included in the sample. Approximately 1225 educators with varying levels of experience and education levels were asked to participate and complete the SoCQ. Table 3.4 reflects district educator experience and education levels. A total of 488 district educators responded to the SoCQ. Participation was voluntary.

Table 3.4: Educator Experience and Education Levels

Degree/ Experience	Bachelor	B+16	Master	B+48	B+64	Ed.D/Ph.D	Total Years
31-40 years	2	1	7	1	16	3	30
26-30 years	40	12	37	15	32	1	137
21-25 years	72	26	41	25	50	0	214
16-20 years	84	20	40	15	23	1	183
11-15 years	66	22	51	10	17	1	167
6-10 years	126	27	36	12	17	1	219
0-5 years	177	32	48	6	6	0	269
Total Experience	567	140	260	84	161	7	1219

(Statistical Profile, 2001)

The district employed 925 females and 310 males. Table 3.5 reflects the district's educator ethnic and gender makeup.

Table 3.5: Educator Ethnicity and Gender

	Black	Native	Hispanic	Caucasian	Other
Male	37	11	11	249	2
Female	94	19	19	789	4
Total	131	30	30	1038	6
Percent	10.6	2.43	2.43	84.05	.49

(Statistical Profile, 2001)

Procedures

To assess the district's emphasis toward professional development and the implementation of computer technology, district information that pertained to demographics, budget information, and professional development was requested. Meetings were held with the district's technology director to address the district's technology plan and information that related to the implementation of computer technology.

To determine educator concerns about the implementation of computer technology in the district, permission was requested and given to use the SoCQ by the Southwest Educational development Laboratory (SEDL) (see Appendix A, page 176). To make district educators aware of the study's survey component, several methods of notification pertaining to the survey were provided to educators prior to the May 24, 2002 survey completion date set by the district's superintendent. The date set by the superintendent, May 24, 2002, was the last day of school for educators and was also a parent-teacher conference day.

First, after garnering permission from the superintendent to conduct the survey for the study, several meetings led to the dates and procedures to be utilized to inform district educators of the survey. An initial letter (see Appendix B, page 178) from the superintendent post dated April 30, 2002 detailed the study and was provided to all district principals and administrators at least a week prior to the April 30. This was deemed to be adequate time to notify administrators to distribute the letter to their personnel and provide those personnel notice of the survey on or shortly after April 30, 2002 date. This initial letter to district educators and administrators noted that participant confidentiality would be upheld and only a site number and participant number would be used to identify the generated data. The letter reflected Internal Review Board, University of Oklahoma-Norman campus requirements and noted the district's desire to structure professional development strategies as a result of the study. Instructions for principals and administrators were provided for distribution of the letter. The information included in the initial letter from the superintendent was again provided to participants in a second letter dated May 24, 2002 as part of the survey completion materials (see Appendix B, page 178). Principals and administrators responsible for distributing and collecting surveys were provided a letter also. This letter included the steps for survey participation and survey return. Surveys were to be collected by site-based administrators and returned through district distribution. Site principals and administrators were given two weeks to return the surveys.

Second, in order to prepare district administrators and principals for the survey, a meeting was held with the executive directors for elementary and secondary education to ask permission to speak to both the elementary and secondary principals about the study.

Permission was given, and an opportunity was provided to address the study with both groups on April 16, 2002 and ask for administrator and principal support in distributing the survey on May 24, 2002 and to return completed surveys as soon as possible (see Appendix B, page 178). This meeting with district administrators and principals was held approximately two weeks prior to the initial letter from the superintendent that was to be distributed to district personnel. Since administrators were to participate in the study, the SoCQ was not specifically addressed at these meetings except to provide general background information. However, the purpose of the study, letters from the superintendent, survey completion and return, and dates were provided to district administrators and principals at that meeting on April 16, 2002.

- April 1, 2002 - Permission given from superintendent to conduct study.
- April 8, 2002 – Permission given from elementary and secondary executive directors to meet with principals at monthly meeting dates to discuss study.
- April 16, 2002 – Meeting with elementary and secondary principals to discuss their support roles in the study.
- April 30, 2002 – Initial letter from superintendent about study and SoCQ distributed to district educators at individual sites.
- May 24, 2002 – Second letter from superintendent and survey materials provided to educators for survey participation.
- June 7, 2002 – Last day for survey return from district sites.

Instrumentation

For the purposes of determining educator concerns toward the inclusion of computer technology in this district, participants responded to the 35-item SoCQ inventory on May 24, 2002 (see Appendix C, page 184). In this study the SoCQ reflected a participant's degree of concern about the inclusion of computer technology. With those educator concerns enumerated, the district's future professional development strategies toward computer technology might be better addressed. According to Herring (1999), the SoCQ is an instrument that isolates individual concerns toward an innovation, in this study the implementation of computer technology. Added to the original SoCQ were four demographic items: age, gender, highest degree earned, and years of teaching experience. That brought the total number of survey items to 39. The instrument was constructed and collated to ensure respondent confidentiality. Only a site number and a participant number identified respondents. Participants and participant responses to the survey remained anonymous.

Through the development of the SoCQ, seven concerns were identified that a user of an educational innovation, in this particular study technology, might encounter: awareness (0), informational (1), personal (2), management (3), consequence (4), collaboration (5), and refocusing (6) (Hord, Rutherford, Huling-Austin, & Hall, 1987). The seven stages of concern about an innovation and an explanation of each stage follow.

0 AWARENESS: Little concern about the involvement with the innovation is indicated.

1 INFORMATIONAL: A general awareness of the innovation and interest in learning more detail about it is indicated. The person seems to be unworried about herself/himself in relation to the innovation. She/he is interested in substantive aspects of the innovation in a selfless manner such as general characteristics, effects, and requirements for use.

2 PERSONAL: Individual is uncertain about the demands of the innovation, her/his inadequacy to meet those demands, and her/his role with the innovation. This includes analysis of her/his role in relation to the reward structure of the organization, decision making, and consideration of potential conflicts with existing

structures or personal commitment. Financial or status implications of the program for self and colleagues may also be rectified.

3 MANAGEMENT: Attention is focused on the processes and tasks of using the innovation and the best use of information and resources. Issues related to efficiency, organizing, managing, scheduling, and time demands are utmost.

4 CONSEQUENCE: Attention focuses on impact of the innovation on students in her/his immediate sphere of influence. The focus is on relevance of the innovation for students, evaluation of student outcomes, including performance and competencies, and changes needed to increase student outcomes.

5 COLLABORATION: The focus is on coordination and cooperation with others regarding use of the innovation.

6 REFOCUSING: The focus is on the exploration of more universal benefits from the innovation, including the possibility of major changes or replacement with a more powerful alternative. Individual has definite ideas about alternatives to the proposed or existing form of the innovation. (Hord, Rutherford, Huling-Austin, & Hall, 1987)

With the use of the SoCQ, a chronological representation of district participants was provided for the implementation of computer technology. The representation reflected where adapters to this innovation were in relationship to the innovation. When an innovation is in its early stages, the awareness and informational stages take precedence, but personal concerns may also be applicable. The SoCQ management stage, which includes consideration of such factors as time and preparation, focuses on the processes needed to successfully utilize the innovation. The last three stages are referred to as impact stages. In the impact stages, educators might be concerned about how the innovation would affect students to the point where collaboration and refocusing could restructure the innovation's effectiveness for impact on student achievement, in this case the implementation of computer technology.

The SoCQ generates data in seven areas of concern with five questions in each area. Hord, Rutherford, Huling-Austin, and Hall, (1987) isolated each stage of concern with its specific questions (see Appendix C, page 184). The use of the SoCQ in this study reflected educator concerns as indicated by the seven stages of the educational innovation of computer technology implementation.

To determine item response scores, the SoCQ used a 0 - 7 Likert scale was used: 0, Irrelevant; 1-2, Not true of me now; 3-5, Somewhat true of me now; and 6-7, Very true of me now. Point values for all items were totaled for a full raw score that exhibited the degree of concern a participant had for the district's implementation of computer technology. The higher the raw score, the greater the degree of concern in a specific stage of the SoCQ for the implementation of computer technology. The lower the raw score, the lower the degree of concern in a specific SoCQ stage for the implementation of computer technology. From the raw scores, group means were determined for statistical analysis. Since descriptive statistics describe the population studied, the mean derived from the ordinal data generated by the SoCQ was used to determine where educators fell into the seven stages isolated by the SoCQ. Hall, George, & Rutherford (1998) indicated an effective method was to aggregate individual data "by developing a profile that presents the mean scores for each stage of the individuals in a group" (p. 32) which is exactly the data that the SoCQ provided for the implementation of computer technology in the district. Inferential statistics were used to generalize the data generated in the study.

The SoCQ was structured after a two-year longitudinal study from1974-1976 (Hall, George, & Rutherford, 1998). In the fall of 1974, 830 educators responded to the SoCQ to determine internal reliability of the instrument. Hall, George, & Rutherford noted that items representing each stage of the SoCQ were selected so that internal reliability was likely. Table 3.6 reflects "the alpha coefficients of internal consistency for each of the seven Stages of Concern scales. These coefficients reflect the degree of reliability among items of a scale in terms of overlapping variance" (p. 11). In a retest two weeks after their initial exposure to the instrument, 171 of the original 830 participants were asked to again respond to the SoCQ. Of those original 830 participants, 132 completed the SoCQ a second time to show the test-retest correlations for internal reliability. Table 3.7 reflects test – retest correlations for the SoCQ.

Table 3.6: Coefficients of Internal Reliability (SoCQ) N = 830

Stage	0	1	2	3	4	5	6
Alphas	.64	.78	.83	.75	.76	.82	.71

(Hall, George, & Rutherford, 1998)

Table 3.7: Test – Retest Correlations (SoCQ) N = 13

Stage	0	1	2	3	4	5	6
Pearson-r	.65	.86	.82	.81	.76	.84	.71

(Hall, George, & Rutherford, 1998)

“Researchers attempted to convey validity by showing that the questions related to each other and other variables, according to the constructs of concern theory. Intercorrelational matrices, judgments of concerns based on interviews, confirmation of group differences, and changes over time were used to determine the following validity numbers” (Herring, 1999, p. 65).

Continued research has further documented the relatively high levels of validity and reliability for the SoCQ. For example, Norton and Gonzales (1998) used the survey to determine teacher placement in the stages of the SoCQ to emphasize technological integration, professional development, and peer support for New Mexico’s Regional Educational Technology Assistance Initiative (RETA). In pre and post surveys, the results reflected that teachers became more concerned with collaboration and student impact after the inclusion of technology. The study helped New Mexico and RETA determine the effectiveness of the initiative. Stroh (1999) corroborated Norton’s findings in a dissertation that reflected as teachers become more familiar with an innovation, they move through the stages of the SoCQ to become more collaboratively oriented and concerned with student impact. Research recognized the importance of determining an educator’s level of concern when implementing the training associated with such implementation. James, Lamb, Bailey, and Householder (2000) in a study funded by GTE to prepare math and science teachers to integrate technology into the curriculum used the

SoCQ to specifically design appropriate professional development activities. Since the survey reflected where educators were in their understanding and fears of technology implementation, professional development strategies could be formulated to move them ahead in the stages. Through the use of the SoCQ, each of these studies reflected the importance of identifying educator concerns to determine if progress was being made with the innovation. Identified educator concerns in these studies also provided for the formulation of professional development strategies. The same was considered in this study.

Data Analysis

The data associated with the implementation of computer technology provided by the district - demographic information, budget information, technology plans, and professional development trainings - enabled the researcher to examine these existing documents as they related specifically to the implementation and effective use of computer technology. Analysis from these materials provided needed insight into the direction of the district as it related to computer technology inclusion

After perusal of the district's demographics, budget, technology plans, and professional development trainings for the implementation of computer technology, a quantitative approach to data collection using the SoCQ provided descriptive data about educator concerns and the implementation of computer technology. Educator responses were analyzed to determine individual levels of concern as indicated by the SoCQ. Then, educator responses were grouped by those particular levels of concern to determine problematic areas for educators in regard to the implementation of computer technology. Levels of concern might then be correlated to district professional development strategies for more effective use of the implemented technology.

The quantitative statistical analysis procedure utilized in this study was descriptive statistics. Descriptive statistics enabled the researcher to describe the nature of the population sample by examining group means in the areas of concern generated by the SoCQ. Of the 1219 possible respondents to the SoCQ, 488 or 40% of district educators completed the survey. Other than the 37 elementary and secondary schools, district administrator sites and other sites in the district made the total number of sites participating to 45. Table 3.8 (page 90) reflects the number of educators in the district at each site and those participating in the study at that site.

Table 3.8: Site and Respondent List

Site	Personnel	Respondents	%	Site	Personnel	Respondents	%
1	62	22	35	24	16	14	88
2	83	72	87	25	40	7	18
3	92	36	39	26	23	13	57
4	83	22	27	27	2	2	100
5	59	7	12	28	34	12	35
6	60	24	40	29	13	12	92
7	74	36	49	30	6	0	0
8	2	1	50	31	29	23	79
9	4	0	0	32	21	0	0
10	5	0	0	33	50	7	14
11	2	1	50	34	26	3	12
12	32	5	16	35	16	3	19
13	14	1	.07	36	32	19	59
14	2	0	0	37	25	0	0
15	15	0	0	38	23	14	61
16	24	19	79	39	22	13	59
17	20	12	60	40	16	2	13
18	24	3	13	41	14	3	21
19	21	19	83	42	20	3	15
20	24	5	21	43	20	12	60
21	27	26	96	44	20	0	0
22	48	0	0	45	28	9	32
23	21	6	29	Total	1219	488	40

In statistics it is recognized that the larger a population sample, the more likely the sample clusters around the true population mean much more tightly, so there is less probability skew associated with the distribution and a greater likelihood of normality. It also allows the assumption that the mean of the sample distribution is equal to the population as a whole, because as the population sample increases, the distribution continues to approach the population normal. In other words, as a result of the descriptive statistics in this study, assumptions could be made to relate educator concerns in the district as identified by the SoCQ to possible professional development strategies in the district for the effective use of computer technology implementation. Forty percent of the possible participants provided the researcher the opportunity to make calculated inferences for district direction in professional development strategies because with that percentage of replies and 487 (n-1) degrees of freedom the study was provided with a degree of power to make such inferences.

Conclusion

Both analysis of existing data and quantitative methods of investigation to determine the district's directions toward the implementation of computer technology were used in this study. The district's acquisition of technology funding, its overall budgets and its professional development budgets for FYs 1999-2001 were coupled with district educator concerns for technology implementation. Was technology implementation tied to technology use after implementation, and were educators provided adequate time and funding to effectively use the implemented technology? The study attempted to provide answers to those questions. Chapter four details the study's data analysis.

CHAPTER IV

ANALYSIS OF THE DATA

Introduction

As noted in Chapter three, this study used both analysis of existing district data and quantitative methods of investigation to obtain information about the district's direction toward the implementation of computer technology. The analysis provided specific information about the district's professional development strategies in computer technology and allowed for deeper insight into the district's emphasis on effectively implementing computer technology. Data were provided for FYs 1999-2000, 2000-2001, and 2001-2002 for the majority of the study, but E-rate funding was considered for FY 1998 as well because extensive infrastructure funding for the district began in 1998. As of November 16, 2002, the district had a shortfall in state funding for FY 2002-2003 of $8.5 million (Bryant, 2002). Unlike Oklahoma education funding during the current FY 2002-2003, FYs 1999-2001 were stable in district funding allocation from the state and provided equitable comparisons for the monetary allocation for professional development in the district's implementation of computer technology. Analysis of data from FYs 1999-2001 was pursued because of such stable state funding. The data generated during FYs 1999-2001 also provided insight into the district's professional development strategies for the implementation of computer technology and money allocated to those endeavors. The analysis addressed the professional development budgets in relationship to the overall district budgets for FYs 1999-2001 and the district's technology plans in regard to professional development strategies as they related to the implementation of computer technology. The study also questioned the fidelity of implementation of district computer technology, and district data was analyzed to determine such fidelity. The research questions associated with the study were:

1. What (if any) was the percentage of funding in the district devoted to professional development toward computer technology training?
2. How much time (if any) was provided to teachers and administrators to enhance their computer technology skills in the professional development strategy?
3. What were the district's plans (if any) for a staff development strategy that incorporated computer technology?
    - Were there follow-up procedures that included long-range training in computer technology?
    - Did the district channel its resources and train to the various levels of abilities among its staff (i.e. novice, intermediate, advanced)?
4. What kind of computer technology training (if any) was being implemented?
    - Was the training for administrative purposes?
    - Was the training for classroom integration?
    - If the focus was on both training for administrative purposes and training for classroom integration, which was done first and why?

5. What were educator levels of concern as they related to the implementation of computer technology?

To collect the data for educator levels of concern, the SoCQ was used to isolate educator concerns as they related to the implementation of computer technology. Though the stages isolated by the SoCQ were distinct, they were not mutually exclusive because they reflected three specific dimensions: Self, task, and impact (Mills, 1997). Such dimensions as isolated by the SOCQ reflected district educator concerns. Isolating these concerns might help further address district professional development as to those concerns and dimensions.

After providing background information as to the acquisition of computer technology in the district, the analysis was approached by addressing each research question as it related to the purpose of the study. As such, each research question in the study was considered individually in the analysis.

Analysis of Existing District Data

Background

Chapter three provided needed insight into the demographics of the district. With 30 elementary schools, seven secondary schools, a student membership of 16,990, a certified staff membership of 1310, and a female to male ratio of almost three to one, the district was comparable to many school districts across Oklahoma and the nation. Minority student population hovered at close to 50% while educator minority population was at about 15%. These and other demographics provided in chapter three might allow comparisons to school districts across Oklahoma and the nation.

An initial perusal of the data provided by the district reflected several items of interest. For example, E-rate funding as provided by the Telecommunications Act of 1996 and available through technology grants from the US government allowed the district to implement its technology infrastructure (Instructional Technology Plan, 1998-2000). The goal of the Telecommunications Act was to provide the technology infrastructure for Internet access to all school sites and school libraries in the nation (USAC Schools and Libraries Program, 2000). E-rate funding grants to the district from FYs 1998-2001 totaled $1,550,516: $521,057 in 1998-1999 and Year I of E-rate funding, $558,151 in 1999-2001 and Year II of E-rate funding, $234,312 in 2000-2001 and Year III of E-rate funding, and $236,996 in 2001-2002 and Year IV of E-rate funding (J. Hammond, personal communication, December 2, 2002). Although these E-rate funding statistics did not impact directly on the impetus of this study, they did reflect the district's determination and motivation to acquire the funding to implement the infrastructure necessary to house computer technology. Such an investment into the implementation of computer technology supported the contention found in the literature that such implementation was costly and should be given attention beyond the implementation stages.

The E-rate funding grants secured by the district enabled the district to build the technology infrastructure to provide Internet access for its students and staff. By 2001 the district had 100% of its libraries and classrooms with a dedicated connection to the Internet (Oklahoma Technology Report Card, 2001). E-rate funding, however, could not be utilized to purchase the district's hardware and software (USAC Schools and Libraries Program, 2000), and, as a matter of record, district insight into the importance of technology might have helped secure E-rate funding for its technology infrastructure (Instructional Technology Plan, 1998-2000). Limited educational funding from the state and the inability of the district to pass any bond issues since 1983 necessitated the district acquire funding for technology hardware and software in other ways. In the last 20 years, the district has passed only one of eight bond issues, the last in 1983 for air conditioning in district schools. Given this background, it was understandable why the district sought alternative funding for technology inclusion.

In 1998, a local foundation known for its propensity to provide funding to education and community organizations provided two matching grants to the district. The first was a three to one matching grant where the foundation provided $300,000 and the district $100,000 to supply teachers in the three high schools with a computer. The second was a three to one matching grant where the foundation provided $900,000 and the district $300,000 to supply both elementary and junior high school teachers with computers (District Accountability Report, 2000-2001). In the accountability report, the district technology director noted that the grants from the foundation helped secure E-rate funding as well because the district had sought and implemented computer hardware and software technology already. As a result of being provided such funding from the local foundation, the acquisition of E-rate funding to the amount of $1,505,516 might have been less had not such implementation of hardware and software already occurred. The district's insight into the relevance of computer technology and its search for alternative sources of funding for such implementation was important to note.

The monetary investment through E-rate government grants and local grants should not suggest that the district had not utilized funds prior to the 1998 fiscal year for technology implementation. That would be far from the truth. However, the amounts invested through the acquisition of E-rate grants and local grants were far more than the district would have been able to invest without them. For example, the district's instructional technology plan was formulated in order to meet E-rate demands and contained a *Phi Delta Kappa Curriculum Management Audit* (PDKCMA) for May of 1997. The PDKCMA was completed prior to the district's initial instructional technology plan's development. The audit noted the district had spent $1,250,000 in FY

1992 and $450,000 in FY 1993 for computer hardware and software purchases (Instructional Technology Plan, 1998-2000). Continued budget constraints and the cost of continually maintaining and upgrading the implemented technology, however, necessitated alternative sources for funding. With investments of $1,790,000 in FYs 1992 and 1993 coupled with E-rate funding and grants from FYs 1998- 2001, the amount invested in technology infrastructure and hardware and software acquisition from 1992-2002 amounted to $4,540,516. Though hardly complete in technology expenditures in which the district invested, this figure certainly supported the contention in the literature that technology investment in America's schools was significant.

Just as interesting to note in the PDKCMA report was their conclusion that the district's "technology planning is inadequate to drive decisions regarding its use" (Instructional Technology Plan, 1998-2000, p. 31). Given the amount invested in technology implementation, it appeared the district had a clear indicator in regard to the audit's finding of the needed direction to pursue in order to harness the implemented technology. To come to these conclusions, the auditors reviewed the *...District Advancing Technology Document*, the precursor to the Instructional Technology Plan, computer allocation at schools in the district, and the five year *Strategic Action Plan* of the district. Schools and classrooms were visited, and teachers and administrators were interviewed. The audit also listed that in which the district was lacking in technology implementation.

These findings were worth noting as they continued to support the contention in the literature that vision and planning that take into account professional development have not normally preceded technology implementation. The lacks noted were:

- Detailed staff development for integration of computer and other technology into the classroom,
- A link between purchases of equipment and software and the nature of the curriculum and instruction of the district,
- The integration of computers into the classroom, but specified through the year 2000 the establishment and maintenance of computer laboratories,
- Detailed development of distance learning, increased television capacity,
- The funding for such acquisitions, development and training (other than general estimated costs),
- A time line for completion, input from the building levels,
- The evaluation system to assure the effectiveness of acquisition, [and]
- Monitoring of the use to assure integration within the curriculum.

(Instructional Technology Plan, 1998-2000, p. 31)

Clearly, at the top of the audit's list of those areas in technology implementation not adequately addressed by the district were professional development and assessment processes that linked the implementation of computer technology to integration with curriculum. The audit noted with exceptional clarity those particular areas of importance as well as those areas the district needed to address.

> The promise of technology can only be realized if teachers have been provided the opportunity to master the technology and are empowered to use more effective models of teaching and learning in their classrooms. The need to provide teachers with sufficient training ranks near the top of virtually every survey or study conducted on determinants to successful implementation of technology as a teaching and learning tool. Within the district, the audit team found:
>
> - no planned approach to either the use of computer software by the classroom teacher or the integration of computer software into the curriculum and instruction process,
> - that most of the professional development for professional staff consisted of training in the use of hardware, the use of Claris Works, and not instructional packages,
> - limited funds allocated over the past three years for staff development,
> - a reluctance on the part of staff to use computers in instruction, [and]
> - a lack of input from the staff to any staff development program concerning the use of computers in instruction. (Instructional Technology Plan, 1998-2000, p. 34)

The audit recommended the creation of a technology plan that addressed all these apparent shortfalls in district planning for the implemented technology and the technology to be implemented later. The auditors made similar recommendations for schools implementing technology that were suggested in the literature.

> Effectively integrating technology must begin with a planned approach, with extensive professional development, and a solid support system of both educators and technical support staff. In addition to the purchase and installation of new hardware, the development of efforts for integration and infusion of computers into the curriculum is warranted. (Instructional Technology Plan, 1998-2000, p. 34).

The PDKCMA audit and its findings and recommendations were used to structure the district's Instructional Technology Plan, 1998-2000. As a result, the plan reflected E-rate criteria for the acquisition of federal funding and included a viable vision for district technology professional development that tied such development to curriculum integration.

The district's Instructional Technology Plan 1998-2000 was concise in its criteria to acquire E-rate funding. It followed both the United States Department of Education plan requirements and the Oklahoma State Department of Education suggestions for development. It included a vision with a plan to put that vision into action based on E-rate participation and funding for a period of three years from FYs 1998-2001. Of course, the district was past those initial years of E-rate funding when the study was conducted, but it continued to participate and receive E-rate funding as a result of the initial technology plan. Of interest to note in the district's initial technology plan was the detail included to accomplish its vision and goals. Not only were various levels of competencies for staff included, but so also was a training regimen that highlighted the relevance of continued technology professional development, technology professional development that recognized individual learning styles and various levels of educator competencies. "Staff technology must be planned with the realization that the needs of the individual adult learners vary in both learning styles and levels of development as much as the variation in student learning styles" (Instructional Technology Plan 1998-2000, p. 13). In other words, the district's initial vision toward technology training included an awareness of both adult learning theory and change theory. The vision also recognized that the implemented computer technology must eventually be tied to student achievement, and it noted that result could be achieved only after the recognition that such a result lay in the hands of district educators that should be provided training in the technology and continued support with the technology. The district's Instructional Technology Plan's impetus was tied directly to the purpose of the study. The study addressed the importance of professional development after technology implementation and the continued support for such development in order to address fidelity of implementation issues in regard to the innovation: "Professional development is the key to effective technology integration and to increased student learning. Our district goal is to give teachers access to technology and ongoing support and time while they learn" (Instructional Technology Plan 1998-2000, p. 11). This was a goal constantly repeated within the document.

Given the detail provided in the district's Instructional Technology Plan 1998-2000, the revised district Technology Plan (2001) was geared to deal with school years 2001-2005. Although it adhered to the original intent of the initial district technology plan, it was not nearly as complete in how to move from the implementation of computer technology to educator ability to effect changes in curriculum through technology professional development. It became a skeleton of the original. Even though it listed initiatives and a time frame in which to accomplish those initiatives, no adequate explanation was provided as to how to accomplish them. For example, it stated as one of the district's goals: "1.0 Continue implementation of the district's technology system to support curriculum/instruction and administrative functions" (Technology Plan 2001, p. 3). However, no evaluation was done since the original technology plan to asses where the district was in regard to such an initiative. Data to assess such an initiative was lacking. Professional development was listed as well: "1.3 Provide technical support services for system equipment and users"[and] "1.3.2 Implement strategies to address professional development needs of teachers and staff relative to the use of technology for curriculum/instruction and administrative applications" (Technology Plan 2001, p.3). The time line listed for 1.3.2 was continuous, but under evaluation of results in the plan, none were listed. It appeared that the district took a step back from its original intent in regard to effectively using the implemented technology through essential technology professional development. Ongoing support noted in the original technology plan was not effective support if no attempt to assess data in regard to educator use and concern since 1998 was made. Provided this background into the district's acquisition of computer technology infrastructure, computer hardware and software, the development of an adequate instructional technology plan to acquire E-rate funding, and the district's revised technology plan, what follows is a look at each research question that related to the analysis of existing data provided by the district and the data generated by the SoCQ.

Analysis of Existing District Data: Research Question 1

Research question number one intended to isolate the percentage of funding the district devoted to professional development and the implementation of computer technology:

> What (if any) was the percentage of funding in the district devoted to professional development toward computer technology training?

In response to this research question, it was important to note that professional development was divided into two distinct entities within the district in each of the fiscal years isolated in the study. The Oklahoma Cost Accounting System (OCAS) provided the code numbers associated with professional development expenditures and any other areas of the district budgets during FYs 1999-2001 that related to professional development and technology inclusion. According to the 2002-2003 OCAS manual, Professional Development OCAS fund 311 provided "Funds appropriated by the legislature and allocated to each [local education agency] LEA on the basis of previous year's [average daily attendance] ADA to provide professional development for LEA certified personnel" (OCAS, 2002, p. C-1) in the district. This provided the district in the study and districts across the state with funds to pursue a variety of educator training including training in technology. Professional Development OCAS fund 312 provided "Funds appropriated by the legislature and allocated to various districts per contract with the State Department of Education for professional development centers stressing professional skills, curriculum, and overall school improvement. The centers serve state educators by providing information, inservice, and professional and instructional resources" (OCAS, 2002, p. C-2). These specific state allocated funds were provided the district because it housed one of seven Professional Development Centers (PDCs) in the state. All seven state PDCs provide educator support. It appeared important to note the distinction between the two professional development funds so monetary allocation in regard to professional development training would be distinct from funds allocated for the state's PDCs.

Table 4.1 provides an overall view of the total district budgets and the professional development budgets for the three fiscal years isolated for the study, FYs 1999-2001.

Table 4.1:District Budgets FYs 1999-2001

DISTRICT	BUDGET 1999/00	BUDGET 2000/01	BUDGET 2001/02
Appropriated	$85,067,276.19	$92,762, 759.58	$99,596,243.30
Budgeted	$86,279,454.59	$93, 114, 772.55	$99,732,103.40
Actual	$80,267,073.66	$89,711,505.48	$96,343,370.29
Balance	$6,012,380.93	$3,403,267.07	$3,338,733.11
Professional Development 311	$165,105.84	$151,271.00	$127,764.52
Professional Development 312	$92,785.00	$95,768.74	$94,353.31

(District Budgets, FYs 1999-2001)

The overall appropriated budgets for FYs 1999-2001 isolated by the study were between $85 million and $100 million. That reflected an increase in the overall appropriated budgets for FYs 1999-2001 of approximately $15 million, a 9% increase. Despite the increase in the overall appropriated budgets, the appropriated Professional Development OCAS 311 funds for FYs 1999-2001 isolated by the study were between $165 thousand and $128 thousand. It was Professional Development OCAS fund 311 that was of specific relevance to this study as these funds provided for educator professional development in the district. The funding decreased $37 thousand over FYs 1999-2001, a decrease of approximately 8%. While the overall district budget increased 9%, the funds allocated for professional development decreased 8%.

Table 4.2 reflects the allocated funding for professional development in the district and the percentage of those amounts to the overall district budgets. Professional Development OCAS fund 312 was included in the table to reflect a decrease in overall funding for professional development and to again note the distinction between the two professional development entities.

Table 4.2: District Professional Development Budget FYs 1999-2001

District	Budget/% 1999/00	Budget/% 2000/01	Budget/% 2001/02
Professional Development 311	$165,105.84 .19%	$151,271.00 .16%	$127,764.52 .13%
Professional Development 312	$92,785.00 .11%	$95,768.74 .103%	$94,353.31 .09%
Professional Development 311 & 312	$257,890.84 .30%	$247,039.74 .26%	$222,117.83 .22%

(Professional Development, ADA Basics, 1999-2001)

It was also included to reflect the use of the facility as part of the district's technology training program. As part of the agreement to acquire Professional Development OCAS 311 funding, the district must provide facilities as in-kind funding. However, Professional Development OCAS fund 311 was the more important of the two when technology training for district educators was considered. Table 4.2 indicates the amount of money allocated to Professional Development OCAS fund 311 decreased from .19% of the overall budget in FY 1999-2000 to .13% of the overall budget in FY 2001. Given the overall district budgets in FYs 1999-2001 isolated by the study, funding for professional development appeared paltry. Even grouped together, both Professional Development 311 funds and Professional Development 312 funds were meager in funding to accomplish district goals for professional development including technology training. Funding has continued to decrease. During FYs 1999-2001, overall district budgets increased while district professional development budgets decreased.

Analysis of Existing District Data: Research Question 2

Research question two intended to isolate the time the district devoted to professional development and the implementation of computer technology:

> How much time (if any) was provided to teachers and administrators to enhance their computer technology skills in the professional development strategy?

In regard to research question two, time set aside for educator professional development and computer technology training was a difficult parameter to pinpoint. Also, certain funding parameters related to technology professional development were included in the discussion of research question two because time set aside related specifically to these directed funds. Five district professional days had been set aside for site based professional development for FYs 1999-2001. Those dates are reflected below.

- FY 99-00 8/18 & 19; 11/11; 1/17; 2/21
- FY 00-01 8/16 & 17; 11/10; 1/15; 2/21
- FY 01-02 8/15 & 16; 11/12; 1/21; 2/18

At this point, however, it was important to note that the district again went beyond its normal means for providing professional development for technology implementation other than those provided through site based training on district professional days. Given the district's past woes in funding resources for any programs beyond those mandated and funded by the state and its inability to pass bond issues related to educational concerns and needs, the district continued to pursue additional funding and resources for technology implementation and technology professional development. Professional Development OCAS 311 funds were one way the district was able to provide professional development for computer technology implementation. As Tables 4.3 (page 111), 4.4 (page 113), and 4.5 (page 114) reflect, however, the overwhelming majority of these approved trainings were site based in the district. Technology professional development also competed with directions other than technology that educators submitted as needs for site based professional development. Other than the limited time able to be provided by the district for technology professional development, limited funding was available as well given the overall district professional development budget.

Another avenue the district utilized to provide professional development for the implemented technology other than site based professional development in technology was through membership in a technology consortium provided by HB 1815 in 1997.

> Through HB 1815, seven million dollars is being made available over a five-year period to train state teachers in the most effective use of telecommunications and distance-learning technology for the enhancement of education. The legislature funded the Oklahoma Department of Career and Technology Education to coordinate the project and serve as the fiscal agent. Approximately $1,345,000 will be available each year for this project, which includes funding six regional consortia. Each consortium includes members from each of the following entities: technology centers, comprehensive schools, and higher education institutions (two-year and/or four-year college/university). Each consortium includes as many institutions in the region as possible (http://www.teletechonline.org/history.htm, 12/20/2002).

The district has been associated with the Southwest Area Teachers Teaching Teachers Technology (SWAT4), one of the state's six consortiums created through HB 1815, and has provided training for area educators in the district and outside of the district. Since the time provided by the district towards professional development for computer technology implementation was of relevance, both site based professional development and professional development as a result of HB 1815 bore discussion.

Site Based District Professional Development

In regard to site based professional development, the district used at least four days of the five set aside for professional days in FYs 1999-2001. Each year, at least part of one of the five days was used for a district wide meeting and district building staff meetings.

When comparing the professional days for the district (page 109) to Tables 4.3, 4.4 (page 113), and 4.5 (page 114) that reflected the district's professional development trainings in technology for FYs 1999-2001, it appeared as if the district was paying heed to professional development in the implementation of technology.

Comparisons reflected the opposite. In FY 1999 (Table 4.3) the district had 93 proposals for site based professional development. Thirteen, or 14%, related to technology.

Table 4.3: Site Based Technology Professional development (FY 99/00)

Site	Date	Title	Cost
39	9/16,21, 23,28	Microsoft Word	$150
4	11/11/99	PowerPoint Grade books	$150
32	11/11/99	Computer Training: Level 1	$NC
29	11/11/99	Integrating Software w/ Curriculum	$NC
6	1/17/00	Technology: Familiarize Teachers w/Components	$350
37	11/17/00	Computer Competency Training Strategies	$50
44	1/17/00	Technology Training: Enhance Classroom Use	$50
1	1/17/00	Computer Training: AVER Key	$50
28	2/21/00	Roundtable Instrumental: Computer Workshop	$20
29	2/21/00	Teaching & Technology: Level 1	$150
44	2/21/00	EAROBIC Training: Effective Use of Technology	$50
		Total	$970

(Professional Development Proposals, 1999-2000)

All of the dates associated with technology site based training were done on those days designated by the district for professional days. No other training dates for site based technology training were provided except for one extended training in Microsoft Word at the district PDC on 9/16, 21, 23, and 28. A perusal of the trainings provided in Table 4.3

reflected just basic workshops for technology except for those provided at Site 29 on 11/11/99 and Site 44 on 1/17/99 that appeared to correlate technology implementation to curriculum. Expenditures for site based professional development in FY 1999 were $970.

In FY 2000 (Table 4.4, page 113) the district had 96 proposals for site based professional development. Of those, 32, or 33%, were related to technology. Again, all of the dates associated with technology site based training were done on those days designated by the district for professional days except for one extended training in Clarisworks on 9/5 & 9/7/2000. No other training dates for site based technology training were provided. Despite 33% of professional development directed toward technology, perusal of the trainings provided in Table 4.4 reflected just basic workshops for technology except for those provided at Site 4 on 11/10/00, Site 25 on 1/15/01, and Site 35 on 1/15/01. These three appeared to correlate technology implementation to curriculum. Total expenditures for site based professional development were $1550.

In FY 2001 (Table 4.5, page 114) the district had 99 proposals for site based professional development. Of those, 15, or 15%, were related to technology. All of the dates associated with technology site based training were done on days designated by the district for professional days. No other training dates for site based technology training were proposed or provided. A perusal of the trainings provided in Table 4.5 reflected just basic workshops for technology except for those provided at Site 2 on 11/15/01, Site 38 on 2/18/02, and Site 15 on 2/18/02. These three appeared to correlate technology

Table 4.4: Site Based technology Professional Development (FY 00/01)

Site	Date	Title	Cost
12	9/5&7/00	ClarisWorks Data Base Training	$NC
1	11/10/00	Using Technology Effectively (Grade Quick)	$NC
1	11/10/00	PowerPoint in the Classroom	$NC
4	11/10/00	Social Sciences Across the Curriculum Using Technology	$NC
3	11/10/00	Technology Training: PowerPoint in the Classroom	$100
6	11/10/00	Technology Workshop	$NC
5	1/15/01	Technology Training and Safety Training	$100
43	1/15/01	Internet Workshop	$50
1	1/15/01	PowerPoint and the Media Retrieval System	$50
3	1/15/01	Round Robin Technology Workshops	$150
1	1/15/01	Technology in the Classroom (MS Office Intermediate)	NC
18	1/15/01	Computer System Network & Systems	$NC
19	1/15/01	Internet Workshop	$150
42	1/15/01	Internet Workshop	NC
21	1/15/01	Technology and Essential Questions of Technology	NC
25	1/15/01	Technology: Using the PC to Deliver Instruction	$50
27	1/15/01	Internet Use for teachers: Sites & Resources	$NC
28	1/15/01	Technology Workshop: Email & Browsing	$NC
29	1/15/01	Internet Use for teachers: Sites & Resources	$NC
31	1/15/01	Wide Area Network	$100
40	1/15/01	Behavior Management, Climate Control, Technology WS	$50
41	1/15/01	New Mac Computer Sites & Resources	$50
42	1/15/01	Internet Workshop: Sites & Resources	$150
35	1/15/01	Troubleshooting the IMACS	$50
45	1/15/01	Internet Computer Training: Effective Utilization	$50
36	1/15/01	Using the Internet)	NC
5	1/15/01	Technology Training: Sites & Resources	$250
35	1/15/01	Aligning Technology w/PASS Reading & Math Objectives	$50
15	1/15/01	Technology Training: Effective Use	$50
40	1/15/01	Technology: Netscape Resources/Interactive Lesson Plans	$NC
		Total	$1550

(Professional Development Proposals, 2000-2001) implementation to curriculum. Total expenditures for site based professional development were $978.

Table 4.5: Site Based technology Professional Development FY 01/02)

Site	Date	Title	Cost
22	8/15/01	Orchard Software Utilization Training	$109
4	11/12/01	Utilizing Digital Cameras to Enhance Science Instruction	NC
2	11/15/01	Use of Multimedia Technology	$100
16	11/15/01	Internet in the Classroom	$50
26	11/15/01	Technology Workshop	$100
32	11/15/01	Orchard Bear Software	NC
34	11/15/01	Technology Workshop	$50
40	11/15/01	Effective Use of Educational Technology	$50
38	2/18/02	Integrating Math and Reading Technology in the Classroom	$50
29	2/18/02	Slide Show for Students (Appleworks)	$50
6	2/18/02	Technology Education (Microsoft Office)	$150
26	2/18/02	How to Utilize PowerPoint in the Classroom	$100
27	2/18/02	Computers in the Classroom (ClarisWorks)	$100
15	2/18/02	Computers in the Writing Process	$69
		Total	$978

(Professional Development Proposals, 2001-2002)

In FYs 1999-2001, a total of $3498 had been allocated to site based technology professional development. Relatively few of the training sessions offered during FYs 1999-2001 went beyond basic instruction in technology use in order to affect curriculum instruction. Given the cost of implementing the technology infrastructure in the district, both monetary allocation and emphasis were miniscule. So was a direction that incorporated the initial vision suggested in the district's Instructional Technology Plan 1998-2000. It was a vision that connected technology implementation, educator awareness of the technology, and student achievement.

> The clearest gains in student achievement will occur when computers and other technologies *supplement* instruction, rather than substitutes for other teaching and learning methods. The best methods of technology are interactive and thus will give learners more control over their own instruction in an open and non-judgmental environment. Computers will be used particularly for problem solving and group work throughout all disciplines. (Instructional Technology Plan 1998-2000, p. 10)

This was hardly accomplished with the piecemeal efforts and the minimal amounts of funding for professional development that were directed toward the use of the implemented technology.

<u>HB 1815 and District Professional Development</u>

Passed in 1997 and designed to implement a five-year program for educator technology training in Oklahoma, HB 1815 created an opportunity for the district to provide technology professional development for district educators beyond those trainings that were site based during professional days. The district made use of that opportunity. As noted previously, the Bill included an emphasis in technology training for Oklahoma educators. The Bill mandated that funding from telecommunications service providers would accrue until a $7 million balance by all providers to the fund was achieved (http://www. oktechmasters.org/1815summary.html,12/20/2002). These funds were used to create six consortiums or regions around the state. The district was a member of the consortium in the southwest part of the state termed the Southwest Area Teachers Teaching Teachers

Technology (SWAT4). The coordinator for the southwest consortium was located in Chickasha. These consortiums then trained area educators, termed Master Trainers after their training, in order for them to continue to train other educators "in the most effective use of telecommunications and distance learning technology for the enhancement of education in Oklahoma" (http://www.teletechonline.org/projectgoal.html, 12/02/2002). The $7 million funding was divided over a period of five years and provided approximately $1.4 million for the six consortiums over the five-year program.

Although the majority of the funding went to house and staff the consortiums and to train the Master Trainers taught to teach fellow educators in their regions (Bonjour, 2002), the primary goal of the consortia was to provide training to as many of the 51,140 Oklahoma educators in technology competencies. Those 51,140 educators included teachers in all Oklahoma public institutions including higher education, K-12 education, and CareerTech. Administrators were not included in this endeavor initially, but they were added in 2000 when SB 1178(1) passed (Bonjour, 2002). Three levels of competencies were identified for the purpose of the technology-training program. However, consortia training actually fell into two categories of competencies. Educators were assumed to have Level One competencies and were to demonstrate such knowledge prior to continuing to Level Two competencies and Level Three competencies.

Level One-competency skills covered basic computer skills, Internet skills, and office suite skills. In order for teachers to participate in telecommunications and distance learning technology training, they had to already have Level One competencies.

Consortia Training Competencies/Level One included:

- Turn on a computer and shut it down properly.
- Start a program, open a file and then exit out of a program.
- Double-click and use click and drag.
- Resize windows on the desktop.
- Get help from help menus.
- Use the find utility to search for folders and files.
- Use control panels to change system settings.
- View and organize folders and files.
- Work within documents using copy, paste, delete, save and other editing and file commands.
- Print documents and other files from within applications.
- Create folders and shortcuts and place them on the desktop.
- Generally use office suite applications.
- Develop a presentation using presentation software.
- Utilize the Internet use a browser (Netscape/Internet Explorer, access WWW sites. (http://www.cvtech.org/swat4/competencies.htm, 12/20/2002)

HB 1815 and the consortiums in the state assumed Level One competencies for educators. However, according to one Master Trainer, such was not necessarily the case in the southwest region (Del Vecchio, 2002). That assumption was misleading as many Oklahoma educators fell short of Level One competencies. Despite this lack, Master Trainers were supposed to begin with Level Two competencies in regard to the mandate set by HB 1815.

Level Two competencies covered presentation technology, distance learning technology, Internet integration, web page development, video production, and other curriculum/technology integration techniques. Consortia Training Competencies/Level Two included:

- Develop techniques to integrate technology and Internet usage into existing curriculum.
- Develop techniques to integrate technology and Internet usage into existing curriculum.
- Adapt content from existing courses to multimedia format.
- Integrate multimedia and visual tools into curriculum delivery including video, presentation graphics, and the Internet.
- Teach search skills and evaluation of on-line material to identify information for use in the classroom.
- Use technology in the IETV classroom.
- Integrate instructional design techniques appropriate for both the classroom or distance learning into curriculum delivery.
- Use multiple delivery strategies effectively.
- Provide experiences that emphasize collaboration among peers or teams.
- Produce multimedia components for integration into instruction.
- Promote learning processes that engage learners in the use of technology.
- Include models for active, cooperative, and collaborative learning among students and faculty into instruction.
- Discuss ethical and legal issues involving technology.
- Assist other teachers in teaching using multimedia in the classroom or in distance learning, preparing them to be comfortable, confident and capable in using new skills in the classroom or distance environment.
- Model highly effective and innovative teaching enabled by information technology. (http://www.cvtech.org/swat4/competencies.htm, 12/20/2002)

Legal and copyright considerations were included in the training as well.

Level Three competencies consisted of advanced distance learning technology and interactive multimedia curriculum development. These competencies were to prepare teachers to develop complete technology-infused curriculum, including use of video, audio, graphics, the Internet, and multimedia development. Consortia Training Competencies/Level Three included:

- Identify and evaluate on-line teaching resources.
- Enhance presentations.
- Utilize appropriate mentoring and coaching skills when and where appropriate to enhance peer teachers' abilities to incorporate technology into their classrooms.
- Create technology infused learner-centered units of practice based upon the model provided.
- Integrate specific technologies into teacher-centered classroom instruction when and where appropriate.
- Describe the current situation of you and your school with respect to integrating technology into instruction, to provide a basis for more detailed personal and organization (school) planning and implementation.
- Share the philosophy and progress of the HB 1815 Telecommunications. (http://www.cvtech.org/swat4/competencies.htm, 12/20/2002)

Both Level Two and Level Three competencies were the primary concern of HB 1815 and the primary concern of the Master Trainers trained to assume the training of other educators in their regions. According to Bonjour (2002), year five of the five year project ended on June, 30, 2002 with a little less than $1 million in carryover funds from the original $7 million for regions to continue training. Presently, no further funding for the consortia continues to accrue. Bonjour also noted that at the conclusion of the five-year program approximately 9500 Oklahoma educators, or 19% of the 51,140 Oklahoma educators were trained in Level Two competencies and approximately 1000, or 2%, of Oklahoma educators had been trained in Level Three competencies. Five years and $6 million later, only 19% of Oklahoma educators were Level Two proficient and 2% of Oklahoma educators were Level Three proficient.

HB 1815, however, provided another outlet for the district in this study to implement technology training. The district also acknowledged the district Master Trainers trained through the SWAT4 consortium concern that Level one competencies needed attention prior to Level two competency training (Del Vecchio, 2002). That was the way the district approached technology training made available through HB 1815: Competency in basic computer skills prior to Level Two competency training. The district also supplemented HB 1815 technology training with stipends from OCAS fund 311 during FYs 1999-2001 in order to compensate the time teachers took to be trained and, more importantly it appeared, because the training was voluntary. Tables 4.6 (page 122), 4.7 (page 123), and 4.8 (page 124) reflect FYs 1999-2001 district funded and HB 1815 funded technology training for teachers and stipend amounts provided to participants. SWAT4 Master Trainer records were used to construct the tables (Del Vecchio, 2002). Level Two trainings and above have been italicized in Tables 4.6, 4.7, and 4.8 for easy reference to distinguish from Level One trainings.

District records in regard to stipends were not accurately reflected in budget expenditures either. All professional development expenditures related to OCAS fund 311 were listed only with the major fund code of 311 and perhaps the object dimension code of 170 that described a certified staff stipend. Unfortunately, no distinction was made as for what that stipend may have been provided. Therefore, it was impossible to distinguish with district records whether a stipend was issued for technology training, writing across the curriculum, or something other (Professional Development, ADA Basics, 1999-2001). Had there been a subject dimension code reflected, district records would have corroborated the materials provided by SWAT4 Master Trainer records. Nevertheless, SWAT4 Master Training records still reflected a considerable stipend investment by the district for technology training during FYs 1999-2001, and these were the records used to isolate district stipend expenditure in technology training related to HB 1815. Stipends provided by the district for HB 1815 training were in the amounts of $100 for Level One competency training and $150 for Level Two competency training. Since no Level Three competency training was done, no amount was reflected for such training.

In FY 1999 (Table 4.6, page 122) (Del Vecchio, 2002) the district trained 173 participants that utilized SWAT4 Master Trainers and provided stipends. Of those, 80% were for Level One competencies and 20% were for Level Two competencies. Level One competency training stipends totaled $10,900, or 68% of the allocated stipends, and Level Two competency training stipends totaled $5150, or 32% of the allocated stipends. No training was done or stipends were allocated for Level Three competencies. It was interesting to note that the district had allocated time in Level One competency training in both the MacIntosh and PC computer formats. Time spent addressing two different formats at different times meant less time spent on Level One and Level Two competencies.

Table 4.6: District and HB 1815 Funded Technology Training/FY 1999-2000

Date	Class	Length	Participants	Stipend	Total
9/7/99	Level 1/PC	20	10	$100	$1000
9/8/99	Level 1/Mac	20	15	$100	$1500
9/8/99	*Inst. Training*	*20*	*2*	*$100*	*$200*
9/11/99	*Web Page*	*6*	*4*	*$50*	*$200*
9/18/99	*Web Page*	*6*	*4*	*$50*	*$200*
9/25/99	*Web Page*	*6*	*3*	*$50*	*$150*
10/3/99	*Web Page*	*6*	*2*	*$50*	*$100*
10/9/99	FilePro/Adm	3	2	$50	$100
10/25/99	Level 1/Mac	20	13	$100	$1300
10/26/99	Level 1/PC	20	7	$100	$700
10/30/99	*Level 2*	*30*	*7*	*$150*	*$1050*
1/8/00	FilePro/Adm	3	8	$50	$400
1/15/00	*Adv. Skills*	*3*	*6*	*$50*	*$300*
1/18/00	Level 1/PC	20	10	$100	$1000
1/19/00	Level 1/Mac	20	18	$100	$1800
1/22/00	FilePro	3	7	$50	$350
2/5/00	*Level 2*	*30*	*7*	*$150*	*$1050*
3/27/00	Level 1/Mac	20	18	$100	$1800
3/28/00	Level 1/PC	20	10	$100	$1000
4/1/00	FilePro/Tea	6	3	$50	$150
6/12/00	Level 1/PC	20	9	$100	$900
6/13/00	Level 1/Mac	20	8	$100	$800
Totals			173		$16,050

Totals	Level 1 Participants / 138	Level 2 Participants / 35

(Del Vecchio, 2002)

In FY 2000 (Table 4.7) the district trained 71 participants that utilized SWAT4 Master Trainers and provided stipends. That number reflected a 59% drop in participants from FY 1999. Of those, 86% were for Level One competencies and 14% were for Level Two competencies.

Table 4.7: District and HB 1815 Funded Technology Training/FY 2000-2001

Date	Class	Length	Participants	Stipend	Total
7/10/00	Level 1/PC	20	5	$100	$500
7/10/00	*Level 2*	*30*	*5*	*$150*	*$750*
9/12/00	Level1/PC	20	7	$100	$700
9/13/00	Level 1/Mac	20	9	$100	$900
11/4/00	*Level 2*	*30*	*5*	*$150*	*$750*
1/01	Level 1/Both	20	25	$100	$2500
3/01	Level 1/Both	20	15	$100	$1500
Totals			71		$7600
Totals	Level 1 Participants / 61		Level 2 Participants / 10		

(Del Vecchio, 2002)

Although not a significant increase in Level One competency training from 80% to 86% from FY 1999 to FY 2000, it was interesting to note that over 80% of the trainings were in Level One competencies in FY 2000. Level One competency training stipends totaled $6100, or 80% of the allocated stipends, and Level Two competency training stipends totaled $1500, or 20% of the allocated stipends. No training was done or stipends were allocated for Level Three competencies. The district allocated time in Level One competency training for the MacIntosh and PC formats. Time spent addressing two different formats at different times meant less time on Level One and Two competencies.

In FY 2001 (Table 4.8) the district trained 90 participants that utilized SWAT4 Master Trainers and provided stipends. That number reflected a 48% drop in participants from FY 1999. Of those, 82% were for Level One competencies and 18% were for Level Two competencies. Although not a significant increase in Level One competency training from 80% to 82% from FY 1999 to FY 2001, it was interesting to note that over 80% of the trainings were in Level One competencies in FY 2001.

Table 4.8: District and HB 1815 Funded Technology Training /FY 2001-2002

Date	Class	Length	Participants	Stipend	Total
10/01	Level 1/Both	20	19	$100	$1900
1/02	Level 1/Both	20	15	$100	$1500
2/02	*Level 2*	*30*	*7*	*$150*	*$1050*
4/02	Level 1/Both	20	20	$100	$2000
4/02	*Level 2*	*30*	*9*	*$150*	*$1350*
4/02	Level 1/Both	20	20	$100	$2000
Totals			90		$9800
Totals	Level 1 Participants / 74		Level 2 Participants / 16		

(Del Vecchio, 2002)

Level One competency training stipends for FY 2001 totaled $7400, or 76% of the allocated stipends, and Level Two competency training stipends totaled $2400, or 24% of the allocated stipends. No training was done or stipends were allocated for Level Three competencies. Again, the district allocated time in Level One competency training for the MacIntosh and PC formats. Time spent addressing two different formats at different times meant less time was spent on Level One and Two competencies.

Table 4.9 represents a composite of district expenditures during FY's 1999-2001 in regard to site based and HB 1815 supported technology professional development.

Table 4.9: Site Based and HB 1815 Technology Training Expenditures/FY 1999-2001

OCAS 311 Funding	Site Based Funding (1)	District Stipends (2)	Total (1+2)	%OCAS 311 (1+2)
FY 1999				
$165,105.84	$970	$16,050	$17,020	10%
FY 2000				
$151,271.00	$1550	$7600	$9150	6%
FY2001				
$127,764.52	$978	$9800	$10,778	8%
		Totals FYs 1999-2001		
$444,142	$3498	$33450	$36948	8%

(Professional Development Proposals, 1999-2001; Del Vecchio, 2002)

Despite both the district's use of site based professional development and HB 1815 district supported professional development, expenditures for educator technology professional development averaged only 8% of the allocated OCAS 311 funds during FYs 1999-2001, the fiscal years isolated in the study.

Site Based and HB 1815 Technology Training: Conclusion

Both site based technology professional development and HB 1815 technology professional development were utilized by the district in order to train educators in the effective use of the implemented technology. Site based technology professional development was piecemeal and usually was provided only on professional days set aside by the district. No district wide coordination was reflected in site based technology training. As such, the vision in the district's original Instructional Technology Plan 1998-2000 was not adequately addressed with such limited access to technology training.

FYs 1999-2001 isolated by the study reflected that 334 district educators received technology training in the district with the help of HB 1815 Master Trainers and district stipends. HB 1815 did not provide stipends for district educators trained in computer technology. The district provided those stipends from its OCAS 311 professional development funds. Both the district's attempt to train its educators in technology use and the district's willingness to provide monetary support for educator time spent at such training was another indicator of the district's concern for the effective use of the implemented technology. However, the results of the participation were not that successful when considering the purpose of HB 1815 and competency training in technology. During FYs 1999-2001, 334 educators in the district received stipends for either Level One competency or Level Two competency technology professional development. Of those, 273, or 82% were trained in Level One competencies and 61, or 18% were trained in Level Two competencies. Level Three competencies were not addressed. If the vision of HB 1815 was to train as many Oklahoma educators and make them Level Three proficient in computer technology, then 2% of the educators in this state being Level Three proficient and no educators in the district during FYs 1999-2001 being Level Three proficient indicated that goal was not accomplished.

Given the time and monetary allocation, little was accomplished in the district toward making educators Level Three proficient or in affecting curriculum with either site based professional development or HB1815 supported professional development. Despite such emphasis in time and funding for district technology professional development, technology professional development without planning and strategies that provided constant support and direction as was noted in the district's Instructional Technology Plan 1998-2000 fell short of its intended purpose.

Analysis of Existing District Data: Research Question 3

Research question three intended to isolate the planning the district devoted to professional development and the implementation of computer technology:

> What were the district's plans (if any) for a staff development strategy that incorporated computer technology?
>
> - Were there follow-up procedures that included long-range training in computer technology?
> - Did the district channel its resources and train to the various levels of abilities among its staff (i.e. novice, intermediate, advanced)?

Plans and Strategies

As noted in the explanation for background district information in the introduction to chapter four and in the analysis of research questions one and two, the district did have an adequate vision in order to address the implementation of computer technology. It's Instructional Technology Plan 1998-2000 clearly delineated the vision and goals the district had for the implementation of computer technology, and it noted concisely the direction the district should take in order to ensure the success of such implementation: immediate and constant educator technology professional development that would impact curriculum. Its Technology Plan, Revised May 2001, was not as clear in its vision and goals for technology inclusion. Neither of the technology plans, however, translated well in regard to particular strategies of technology professional development. As noted in the explanation of research question two, site based strategies for technology professional development were sporadic and piecemeal and did not reflect the initial vision elucidated in the district's Instructional Technology Plan 1998-2000. No doubt, funding was a problem when considering such strategies as noted in the analysis of research questions one and two, but the idea of strategies that addressed the continued support for technology professional development never developed beyond district site based attempts until HB 1815 provided additional funding and trainers for the district to utilize. However, the training regimen provided by HB 1815 did not lead to Level Three competency for district educators during FYs 1999-2001. The training provided little technology professional development beyond basic computer technology competencies as data analyzed in research question two noted. That was not the vision of the district's initial technology plan. Nor did it successfully address the PDKCMA report's concerns elucidated some three years earlier.

- no planned approach to either the use of computer software by the classroom teacher or the integration of computer software into the curriculum and instruction process,
- that most of the professional development for professional staff consisted of training in the use of hardware, the use of Claris Works, and not instructional packages,
- limited funds allocated over the past three years for staff development,
- a reluctance on the part of staff to use computers in instruction, [and]
- a lack of input from the staff to any staff development program concerning the use of computers in instruction. (Instructional Technology Plan, 1998-2000, p. 34)

The district appeared to be in the same technology dilemma it was in years earlier. Despite the emphasis on technology professional development, the distance between the implementation of computer technology and its impact on curriculum lay where it was addressed – in the district's Instructional Technology Plan 1998-2000.

Follow-Up Strategies

No follow-up strategies that prioritized educator technology competence in the district were evident. The district's original Instructional Technology Plan, 1998-2000 noted the importance of such continued support for technology professional development, and it noted that educator technology proficiency should be directly tied to curriculum enhancement. Even though educator levels of proficiency were listed in the district's original technology plan, it appeared that no such strategies were put into motion that kept track of educator levels of proficiency or recorded those proficiency levels until HB 1815 and Level One through Level Three competencies were introduced and prioritized. Until then, technology professional development was site based and offered only on professional days. No concern among the sites to coordinate technology training or to provide training based on the level of technological proficiency was evident. Follow up procedures were not evident when planning for site based technology professional development.

Follow-up procedures were considered when the district utilized HB 1815 Master Trainers to provide technology professional development. As noted in the analysis of research question two, the majority of the time and funding was allocated to provide training for Level One competencies, competencies that HB 1815 and the six consortiums it provided in the state already suggested Oklahoma educators had. Such emphasis on Level One competencies by the district limited training in the competencies that mattered most since affecting curriculum was the desired outcome.

Resources and Levels of Training

Although the district's Instructional Technology Plan 1998-2000 isolated specific competency levels for educator technology professional development, such levels were not directed toward district educator levels of proficiency until HB 1815 provided the trainers to teach to those competencies. Until then, piecemeal site based technology professional development that did not teach to these competency levels were provided. Of interest to note was the similarity of the competency levels noted in the district's Instructional Technology Plan 1998-2000 and those developed through HB 1815. Each provided three levels of proficiency, and each noted a level three proficiency that was specifically designed to enhance curriculum. Both the district's Instructional Technology Plan 1998-2000 and HB 1815 noted educator technology professional development was the key to successful implementation of the technology. As the district's Instructional Technology Plan 1998-2000 noted:

> This technology plan goes beyond just hardware acquisitions. It is our belief that the classroom teacher plays a critical role in the successful integration of technology. It is not the technology that will impact how students learn, but how educators transfer their technological skills transparently into the curriculum and instruction delivered in the classroom. This change requires continuous training and support for both teachers and administrators. (p. 14)

Though the district's vision was clear, the planning and strategies directed to create this result were not. Even when the opportunity to train to district educator levels of competency in computer technology was provided by HB 1815, the voluntary nature of the training limited results. Educators were provided the opportunity to participate in the training, but the training was not coordinated to achieve the impact that was directed toward curriculum in the district's initial technology plan. In essence, the district did not effectively channel its resources to train to the various competency levels of its educators. Effective planning that elucidated the vision and strategies that helped move educators through the various competency levels appeared inadequate.

Analysis of Existing District Data: Research Question 4

Research question four intended to isolate the type of computer technology training the district devoted to professional development and the implementation of computer technology:

What kind of computer technology training (if any) was being implemented?

- Was the training for administrative purposes?
- Was the training for classroom integration?
- If the focus was on both training for administrative purposes and training for classroom integration, which was done first and why?

Although not initially intended when the research questions were structured, research question four was answered when the data for research questions two and three were analyzed.

Technology Training

Types of training were enumerated in the analysis of site based technology professional development and technology professional development as a result of HB 1815 in research question 2. Site based technology training depended completely upon educator or administrator professional development proposals and were not correlated to a district plan or strategy for technology professional development.

Training Purpose

District site based workshops and competency level trainings as provided by HB 1815 during FYs 1999-2001 reflected no discernable distinction between administrator or teacher technology professional development. Although the district provided a few workshops for administrator training only, these trainings were sporadic. Most site based technology training and technology training as a result of HB 1815 were directed toward district teachers.

Classroom Integration

Although some site based technology training for educators might have been linked to classroom integration of computer technology, these were sporadic and not connected to an overall strategy to affect curriculum. Technology professional development as a result of HB 1815 was to affect curriculum as well. However, as indicated in the analysis of the data for research questions two and three, neither approach accomplished the goal: During FYs 1999-2001, 334 educators in the district received stipends for either Level One or Level Two technology professional development. Of those, 273, or 82% were trained in Level One competencies and 61, or 18% were trained in Level Two competencies. Level Three competencies were not addressed. Since Level Three competencies were not addressed, affecting district curriculum that was reflected in the district's Instructional Technology Plan, 1998-2000 did not occur.

Training Focus

Provided the analysis of the data in research questions 2, 3, and 4, this specific aspect of research question four was no longer applicable. The district did not distinguish between administrator and teacher technology professional development. This was an area that the district might address as administrator technology use differs in many ways from teacher technology use. The administrator impacts the teacher, and the teacher impacts students. Training should address those separate concerns. Both district entities, however, should be looking toward Level Three competencies as defined by HB 1815.

Quantitative Data: Research Question 5

Research question five intended to isolate district educator levels of concern as noted by the SoCQ in order to direct the district toward specific professional development strategies with the implementation of computer technology:

> What were educator levels of concern as they related to the implementation of computer technology?

Introduction

Though there were various levels of interpretation in regard to the SoCQ, the procedure chosen for this analysis was to interpret "aggregate individual data by developing a profile that presents the mean scores for each stage of the individual in a group" (Hall, George, & Rutherford, 1998, p. 32). Group mean scores were used to address educator concerns in the implementation of district computer technology to provide the district directions and strategies for technology professional development related to educator concerns. Isolating educator concerns might provide the district insight into the concerns educators have about the implementation of computer technology. Such data might enable the district to determine courses of action for technology professional development. Stages four, five, and six of the SoCQ, the impact stages, reflect educators that are not only comfortable with the innovation, but educators who wish to impact curriculum with the innovation. It should be the goal to move educators toward these levels by addressing their immediate concerns, constantly reassessing their concerns, and then again developing professional development that moves them toward the stages of concern in the SoCQ that impact both the educator and the curriculum.

Hall, George, and Rutherford (1998) noted that interpretation of the mean scores provided by aggregate data is "the straightforward translation of the high and low stage scores based on the Stages of Concern definitions" (p.32). The higher the mean score, the more intense were the concerns in that stage of concern. Hall, George, and Rutherford also suggested correlating the peak, or highest concern, with the second high stage score to develop additional insights into concerns. Although Hall, George, and Rutherford indicated there might be some problem correlating aggregate data in this way because individual responses may differ between first and second stage concerns, useful inferences might be provided when using the same approach to aggregate data. This held true in this study as an attempt was being made to address district technology professional development strategies as a result of group concerns. That was the approach used in this analysis.

Educator Concerns and the SoCQ

Table 4.10 (page 138) reflects the group mean scores generated by the survey with district educator participation. In Table 4.10 the peak mean score, Stage 2, the second highest mean score, Stage 1, and the third highest mean score, Stage 4, were italicized and prioritized to reflect those areas of concern that were of particular importance to the analysis. Of specific interest were the peak mean score and the second highest mean score. Hall, George, and Rutherford (1998) noted that analysis of the second high mean might add insight into the dynamics of concern. Looking at the peak mean score and the second high mean score, the most important educator concerns in regard to the district's implementation of computer technology fell in the Personal Stage, Stage 2, and in the Informational Stage, Stage 1. The third highest mean score was reflected in the Consequence Stage, Stage 4.

Of significance as well were the lowest group mean scores reflected by the Awareness Stage, Stage 0, and followed closely by the Refocusing Stage, Stage 6. Stage 5, Collaboration, followed these.

Table 4.10: Stages of Concern – Educator Group Means

	N	Minimum	Maximum	Mean	Std. deviation
Stage 0 – Raw Score, Awareness (questions 3, 12, 21, 23, 30)	488	0	34	15.68	6.728
Stage 1 – Raw Score, Informational (questions 6, 14, 15, 26, 35) High Mean #2	*488*	*0*	*35*	*22.86*	*5.937*
Stage 2 – Raw Score, Personal (questions 7, 13 17, 28, 33) Peak Mean	*488*	*0*	*35*	*23.43*	*7.041*
Stage 3 – Raw Score, Management (questions 4, 8, 16, 25, 34)	488	0	35	18.79	7.190
Stage 4 – Raw Score, Consequence (questions 1, 11, 19, 24, 32) High Mean #3	*488*	*0*	*35*	*21.14*	*6.961*
Stage 5 – Raw Score, Collaboration (questions 5,10, 18, 27, 29)	488	0	35	18.65	7.830
Stage 6 – Raw Score, Refocusing (questions 2, 9, 20, 22, 31)	488	0	35	16.49	6.738

(Hall, George, & Rutherford, 1998)

The Peak Mean and Second High Stage Scores

Despite the longevity associated with district technology implementation and the time and funding associated with technology professional development during FYs 1999-2001 isolated by the study, district educator concerns focused primarily on the purpose of the implementation of computer technology and uncertainties and fears about the implementation. That indicated that the district had not done enough to make its educators aware of the goals of the innovation's implementation, nor did it provide adequate information to alleviate basic uncertainties about how the implemented technology should be used. As noted by Hall, George, and Rutherford (1998):

> A high Stage 1 score is indicative of intense concerns about what the innovation is and what use of the innovation entails. Persons who have intense Stage 1 concerns are interested in having more descriptive information about the innovation. They are not concerned about the 'nitty gritty' details, but, rather, what general information about what the innovation is, what it will do, and what use would involve. Stage 1 concerns do not have a strong "self" component. They are quite substantive in nature, focusing on the structure and function of the innovation. Stage 2 personal concerns deal with what Fuller referred to as "self" concerns. A high Stage 2 score is indicative of ego-oriented questions and uncertainties about the innovation. Concern about status, reward, and potential or real effects of the

innovation on the respondent are of high concern. A respondent with relatively intense personal concerns may, in effect, operationally block out more substantive concerns about the innovation. (p. 31)

Provided the analysis of the sporadic technology professional development offered by the district, such concerns as to the purpose of the implemented technology and uncertainties about the implemented technology for district educators appeared reasonable. As noted in chapter one of this study, such fears of technology actually inhibited its effective use. Those fears should be addressed through technology professional development. Kagima and Hausafus (2001) indicated many barriers had been isolated that inhibit educators' ability to adopt technology. They quoted Herring (1997) and Kelsey (1997) as identifying these barriers as " 'career concerns, lack of institutional support, fear of being replaced by the technology, and the lack of technological competence' " (pp. 33-34). When it came to the use of technology, such fears by educators provided researchers a strong connection to the importance of professional development programs to incorporate such technology. The district in this study did not effectively translate its technology vision and goals to its educators. Nor did it provide effective technology professional development to alleviate their immediate concerns. In order to move educators to the more impact oriented stages for effective utilization of the innovation, these immediate concerns need to be addressed. As a result, further district technology professional development should begin with these educator concerns.

Third High Stage Mean Score

The third high stage mean score bears discussion for several reasons. First, given district educator immediate concerns that pertained primarily to uncertainties, fears, and a basic lack of understanding about the implemented technology, a high Stage 4 score appeared somewhat out of place. A high Stage 4 score indicated that respondents were concerned about the impact of the innovation, especially in a respondent's immediate sphere of influence, in the case of this study, the classroom. Concerns were related to student outcomes including curriculum and the changes that are needed to affect those outcomes – including changes that the educator should embrace to effectively employ the innovation to produce such outcomes (Hall, George, & Rutherford, 1998).

It appeared that despite educator concerns, the technology implemented was seen as something that could be used to affect curriculum and student achievement. The district should heed this as a positive sign from area educators as to their willingness to utilize the implemented technology provided the professional development necessary to do so.

Low Mean Stages Scores

As noted previously, of significance as well were the lowest group mean scores reflected by the Awareness Stage, Stage 0, the Refocusing Stage, Stage 6, and the Collaboration Stage, Stage 5. According to Hall, George, and Rutherford (1998):

> Stage 0 has two very different meanings depending on whether the respondent is a user or a nonuser of the innovation. For nonusers of the innovation, a high peak score on Stage 0 reflects awareness of and concern about the innovation, while for users of the innovation, a high Stage 0 score indicates lack of concern about the innovation. (p. 31)

Recognizing that the aggregate mean score for Stage 0 was the lowest in district educator responses might provide the district insight that its educators were more concerned about what to do with the technology and how the technology would impact the educator in his or her job. It appeared that not enough information was provided to district educators as to how the technology was to be used. As the literature indicated, providing the technology does not accomplish its intended purpose, and making educators aware of the intent of the implemented technology was considered a priority. Low mean scores in Stage 5 and in Stage 6 reflected that the district had not fulfilled its vision and goals provided in its Instructional Technology Plan, 1998-2001. Adequate technology professional development to place its educators in a position to affect curriculum had not been provided. These concerns also reflected the district's technology professional development had accomplished little to move educators to the more important impact stages of curriculum enhancement. Despite the district's expenditures and attempts to provide such training, the results were not promising.

Survey Conclusion

The results of the survey indicated that the two highest mean scores were in Stage 2 and in Stage 1. It appeared that district educators were uncertain about their roles in regard to the implemented technology and were at the same time interested in its possibilities. Hall, George, and Rutherford (1998) noted the following about Stage 1 and Stage 2:

> Stage 1 - Informational: A general awareness of the innovation and interest in learning more detail about it is indicated. The person seems to be unworried about herself/himself in relation to the innovation. She/he is interested in substantive aspects of the innovation in a selfless manner such as general characteristics, effects, and requirements for use.
>
> Stage 2 - Personal: Individual is uncertain about the demands of the innovation, her/his inadequacy to meet those demands, and her/his role with the innovation. This includes analysis of her/his role in relation to the reward structure of the organization, decision making, and consideration of potential conflicts with existing structures or personal commitment. Financial or status implications of the program for self and colleagues may also be rectified. (p. 7)

The district should recognize it has not accomplished enough in its attempt to move its educators toward the impact stages of consequence, collaboration, and refocusing. Because the third highest mean score fell in the Consequence stage, district administrators should notice its educators were concerned about the innovation's impact.

> Consequence: Attention focuses on impact of the innovation on students in her/his immediate sphere of influence. The focus is on relevance of the innovation for

students, evaluation of student outcomes, including performance and competencies, and changes needed to increase student outcomes. (p. 7)

The recognition of educator concerns in these stages might help motivate district administrators to provide coordinated and constant technology professional development to where district educators might impact curriculum. Such an approach might help to fulfill the original intent of district implementation of computer technology. Such an attempt might reflect to the American taxpayer that the expenditure toward technology inclusion has been worthwhile.

Conclusion

The analysis provided information about the district's implementation of computer technology primarily during FY's 1999-2001and its professional development strategies in computer technology after implementation during FYs 1999-2001. E-rate funding for FY 1998 was considered as well as extensive technology infrastructure funding for the district began in 1998. The study looked into whether fidelity of implementation of computer technology in the district had been met in regard to technology professional development for district educators after technology implementation. The analysis of the data reflected that it had not.

Several factors led to this conclusion. Adequate funding and time provided for technology professional development were a constant problem for the district was one factor. Although the district should be commended for going beyond normal means of funding to implement technology and to provide technology professional development, the end result reflected in its original Instructional Technology Plan, 1998-2000 for the technology to impact students had not been achieved. The efforts directed toward technology professional development, the district's site based technology training and HB 1815 technology training, did little to make educators Level Three competent. Site based efforts were piecemeal, and HB 1815 efforts spent too much time on Level One competencies. Another factor reflected the district's lack of administrative direction in regard to technology inclusion. In the district's Instructional Technology Plan 1998-2000, it was noted that the technology would be disseminated eventually to students by a facilitator. The teacher was to use the power inherent in the technology just like other educational resource materials to provide direction and guidance to students. The means to accomplish such a goal was technology professional development for educators. Given the voluntary nature of technology professional development that the district employed, this was not accomplished. Educator stages of concern as noted by the SoCQ indicated that district educators had personal concerns and wanted information about the use of the technology and was another factor that inhibited fidelity. These areas bear addressing to provide district educators the means to effectively use the implemented technology and impact student outcomes.

CHAPTER V

SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS

Summary

Introduction

As noted in the introduction to Chapter 1, the implementation of computer technology in America's schools necessitated billions of dollars in financial investment. Funding to supply the infrastructure, the hardware, and the software for technology inclusion while attempting to stay current in computer technology inclusion in education was expensive. In the past five years, however, attention began to shift in focus toward how the implemented computer technology in America's schools was being used. This shift was long overdue. McNabb, Hawkes, and Rouk (1999) provided perspective for such a shift:

> Where once the emphasis was on building and implementing a technology infrastructure, today it is on evaluating the effectiveness of its use in schools and classrooms.... Indeed, if resources are to be expended on technology, it is becoming a political, economic, and public policy necessity to demonstrate its vital effectiveness. (p. 1)

The attention usually directed toward monetary investment for technology implementation has been refocused to determine how the implemented technology should be used. Technology use should be evaluated to determine if the billions of dollars invested have been invested wisely. As McNabb, Hawkes, and Rouk noted, such investment is political, economic, and one that influences public policy. Researchers also noted that the implementation of computer technology was only the first step in a process that should yield results in student achievement. For example, Doherty and Orlofsky (2001) suggested "that all of the nation's schools – whether rich or poor in technological resources – need to focus more attention on how to use their existing technology effectively in the classroom" (p. 45).

The transition from computer technology implementation to its effective use requires a vision and planning from the inception of the implementation to the desired results. Usually, it was assumed that a vision for training those responsible for its use, technology professional development for the educators responsible for technology outcomes from the implemented technology, would be included in such a vision. Also assumed was a way to fund such technology professional development. Given the expenditures provided for technology implementation, such assumptions were common. The literature contended, however, that this was rarely the case. Relatively few of America's schools followed researcher's suggestions to provide a vision that enumerated the goals of such inclusion, funded that vision, and included a professional development strategy that focused on the effective use of the technology by educators in order to enhance the educational experience of students. Even if a vision included those criteria, and the district in the study did, the designated outcomes were not necessarily accomplished.

The distance between the inclusion of an innovation such as computer technology and the effective use of such an innovation after its implementation was clearly addressed in the literature by Fullan and Pomfret (1977).

> There is a singular lack of curiosity about what happened to an innovation between the time it was designed and various people agreed to carry it out, and the time that the consequences became evident. Once an innovation was planned and adopted,

> interest tended to shift toward the monitoring of outcomes. The assumption appears to have been that the move from the drawing board to the school or classroom was unproblematic, that the innovation would be implemented or used more or less as planned, and that the actual use would eventually correspond to planned or intended use. The whole idea of implementation, what the innovation actually consists of in practice and why it develops as it does, was viewed as a 'black box' where innovations entering one side somehow produce the consequences emanating from the other. (p. 337)

Just as important as a vision that provided constant professional development and funding for such a complex innovation as computer technology to eliminate the "black box" syndrome was an understanding of the processes inherent in such inclusion and the people incorporating such inclusion. As Fullan and Pomfret (1977) noted, the implementation process for an innovation appeared to include the effective use of the innovation after implementation. Such assumptions were typical and, unfortunately, unfounded. Hall and Loucks (1977) indicated: "In sampling for research, evaluation, and even staff development activities, it is essential to have first-hand documentation that the innovative process or product is, in fact, being used and at what level" (p. 274). Researchers noted data that reflected an innovation's effective use was essential. Both Fullan and Pomfret (1977) and Hall and Loucks (1978) referred to this attention between the implementation of an innovation and the effective use of an innovation as fidelity of implementation. The ability to provide adequate time, funding, and attention to professional development in order to realize the potential of computer technology among educators, that fidelity of implementation researchers found important, has not been addressed effectively with technology inclusion in America's schools. The billions of invested dollars in technology inclusion, however, necessitated the above concerns that related to the effective use of computer technology be addressed.

The monetary investment for technology inclusion in America's schools has certainly impacted the American taxpayer. Such an emphasis on technology in America's schools has impacted educators also, and researchers have noted the disparity in financial investment that existed for the implementation of technology in education and for its effective use after implementation. This study addressed the fidelity of implementation of computer technology in a school district in southwest Oklahoma and determined how technology was implemented in the district by addressing data that included: the vision and goals isolated in the district's technology plans; how the vision and goals in the technology plans were addressed; district budget allocations including funding allocations for professional development in fiscal years 1999-2001; district professional development training associated with technology inclusion; and educators' levels of concern in regard to such implementation. The study was structured in this manner to faithfully address the fidelity of implementation issue researchers found important. Wolosoff (1998) pointed out: "As educators, we must constantly assess *what* we need, for *whom* we need it, *when* we need it and *why* we need it if we are to bring meaningful integration of technology into the curriculum. If we proceed haphazardly in our plans, we will achieve the physical accumulation of hardware and software without the warranted benefits" (p. 53). Such insight about technology inclusion pointed directly to the importance of understanding both change theory and adult learning theory in the planning process. As this study reflected, such a haphazard approach might negate the intent of such technology inclusion. A vision of technology inclusion that does not provide continued technology professional development for America's educators might also negate that intent.

Conclusions

Summary of Data Analysis

This study analyzed existing district data in regard to the implementation of computer technology and used a survey, the SoCQ, to obtain information about educator concerns toward the implementation of computer technology. Specific information about the district's technology direction, expenditures, and professional development strategies in computer technology were obtained. District budgets and expenditures were examined to determine monetary allocation for professional development and specifically computer technology professional development. District technology plans were examined to determine if a technology vision that included time, planning, and funding for professional development strategies in computer technology had been included. District administrators in positions to provide information and direction for the study were contacted for materials to supplement data provided by the district. The research questions structured for the study were:

1. What (if any) was the percentage of funding in the district devoted to professional development toward computer technology training?
2. How much time (if any) was provided to teachers and administrators to enhance their computer technology skills in the professional development strategy?

3. What were the district's plans (if any) for a staff development strategy that incorporated computer technology?
   - Were there follow-up procedures that included long-range training in computer technology?
   - Did the district channel its resources and train to the various levels of abilities among its staff (i.e. novice, intermediate, advanced)?
4. What kind of computer technology training (if any) was being implemented?
   - Was the training for administrative purposes?
   - Was the training for classroom integration?
   - If both training for administrative purposes and training for classroom integration were focused on, which was done first and why?
5. What were educator levels of concern as they related to the implementation of computer technology?

In the analysis of existing district data to acquire answers to these research questions, several areas of interest in regard to the implementation and the use of computer technology surfaced including how the district developed professional development for technology inclusion.

The first area of interest was the monetary investment the district generated as far as implementing a technology infrastructure and how the majority of the funding was acquired. Including E-rate funding, local foundation grants, and district investment, the district generated and invested $4,540,516 for technology inclusion. As noted in the analysis of the data in chapter four, the district's search for alternative sources of funding to harness its technology infrastructure was commendable, as those alternative funding sources enabled the district to accomplish such technology implementation. Such an investment also supported the contention in the literature that significant amounts of money were being invested in America's schools. However, the monetary investment was for the purpose of implementation. Problems arose in regard to professional development for educators after implementation. Although the district's Instructional Technology Plan 1998-2000 had been developed to acquire E-rate funding, it also included a well-developed vision that included planning, time, and possible funding sources for technology professional development after implementation. Either the district did not pay adequate attention or was not able to pay adequate attention to that vision after technology implementation. The vision in that plan should have been revisited on a continual basis in order to ensure the proposed district plan toward technology inclusion was being adequately addressed. Certainly, limited technology professional development funding may have been a problem as to why the goals in the vision noted in the district's Instructional Technology Plan 1998-200 were not addressed. Funding for overall district professional development was limited and was included in state allocated OCAS 311 funds. In the district's records, technology funding was not easily distinguishable from the overall professional development funding. Although the district's overall budgets in FYs 1999-2001 increased 9% from $85 million to $100 million, the district's professional development budget decreased 8% from $165 thousand to $128 thousand. Very little of the allocated overall professional development budget was used for technology professional development. Over FYs 1999-2001, only 8% of the district's professional development budget went toward technology training. Those trainings included both site-based and HB 1815 technology professional development funded by the district through stipends. Reassessment of technology training needs during FYs 1999-2001 for site-based professional development as far as goals reflected in the district's initial technology plan did not occur. This perhaps helps confirm that educational funding for professional development has been given low priority versus other immediate gains.

The second area of interest reflected exactly how these technology professional development funds were being used. To discuss this area, it is relevant to mention the district's Instructional Technology Plan 1998-2000 again, as it indicated the importance of providing adequate time and proper training to the educators using the implemented technology because, as the Plan noted, the key to the successful use of the technology lay in educators' hands. It is also relevant to mention that the district's search for alternative sources to help fulfill this goal was commendable because allocated state funding for professional development was minimal. Site based technology professional development and technology professional development supplied through HB 1815 supplied the primary focus for technology professional development in the district.

Although the district's site-based technology professional development provided opportunity, it was a smorgasbord in its approach and offered no viable means of coordinating district technology training. Such site-based training was also limited to professional days isolated by the district. The district's Instructional Technology Plan 1998-2000 reflected the importance of continued and constant technology training for its educators. As noted in chapter four:

> This technology plan goes beyond just hardware acquisitions. It is our belief that the classroom teacher plays a critical role in the successful integration of technology. It is not the technology that will impact how students learn, but how educators transfer their technological skills transparently into the curriculum and instruction delivered in the classroom. This change requires continuous training and support for both teachers and administrators. (p. 14)

It appeared that site-based technology professional development during FYs 1999-2001 did not accomplish that. HB 1815 and its Master Trainers provided the district the opportunity to prepare its educators to achieve different levels of competencies, the goal being a level three competency that was to have placed educators in a position to affect student achievement through technology use in the classroom. These competencies were similar to those the district's Instructional Technology Plan 1998-2000 listed as competencies district educators should exhibit in order to effectively utilize the implemented technology. The majority of the trainings, 80%, fell into level one, very basic computer competencies. Twenty percent fell into level two competencies. None were trained in level three competencies, the purpose of the implementation. Despite the district's best intentions and expenditures of $36,948 for professional development in FYs 1999-2001, little was accomplished in regard to training educators for the effective use of the implemented technology. As noted by the SoCQ results for the district, educator concerns were highest in the personal and informational stages of computer technology implementation. Given that 80% of district educators achieved only Level One competencies, and that on a voluntary participation basis, the results of the district survey seemed plausible. The long-range goals for training the district's educators in technology that were noted in the district's initial technology plan and the vision it incorporated have not yet been implemented successfully. Beavers (2001) noted the same pitfalls into which the district fell earlier in chapter two of this study:

> School after school has learned the hard way that simply having computer equipment doesn't matter if teachers don't know how to use it. If the problem is that teachers don't know how to use the technology, the solution must be professional development, right? Of course. But conventional, intermittent staff development

> workshops that focus only on the mechanics of using computer technology are not the answer.... Effective integration of technology into education calls for a new vision of professional development – not one that attempts merely to add technology to an established system but one that takes a fresh look at teaching and learning in general. Professional development composed of a few days of in-service workshops every year must be replaced by ongoing programs that are tied to your school's curriculum goals, designed with built in evaluation, and sustained by adequate financial and staff support. (p. 43)

Such ongoing programs that Beavers suggested, however, require funding, coordination, and constant attention. It is an attention that should focus on a variety of issues including the continuous reassessment and evaluation of the implemented technology, the importance and influence of lifelong learning for educators, and the impact of changes in the educational process. Given that the district had a technology plan with a vision that discussed all these aspects of technology inclusion and technology success including adult learning theory and change theory, it was unfortunate the district has not yet been able to follow that vision through.

The third area of interest reflected district educator levels of concern in regard to the implemented technology. Given the previous two areas of interest in regard to the analysis of existing district data, both the lack of funding and the lack of appropriate time for technology training appeared to corroborate educator levels of concern as isolated by the SoCQ. Educators completing the SoCQ most often expressed informational, personal, and consequence concerns. Given that the district technology training was provided on a voluntary participation basis, and not all of the district's educators had participated in that training, such concerns appeared logical. For those that did participate in some technology training, given the explanation in regard to site-based and HB 1815 technology professional development, the majority of those were trained in level one computer competencies. It appeared logical to assume that district educators were primarily concerned with the purpose of the implementation and how it would affect both them and their students. Such results reflected that district educators needed further technology training in order to move their concerns toward the impact stages in regard to the innovation. Even though district educators were concerned with the consequences of the innovation, these appeared to be more correlated to personal and informational concerns as opposed to collaboration and refocusing concerns because the peak mean reflected personal concern. With these isolated educator concerns, district administrators might use these results for future technology professional development strategies. In order to create the opportunity for district educators to impact student learning, district technology professional development should lead its educators toward the impact stages as isolated by the SoCQ. As Mills (1997) noted: ...for systemic change to occur the focus of the change must become our view of the role of the teacher in implementing technology" (p.139). Mills supported his suggestion for implementing Integrated Learning Systems in elementary schools by citing previous research by Hord, Rutherford, Huling-Austin, and Hall (1987) that further supported the findings in this study:

> One of the first lessons learned from conducting research on change and the implementation of computer technology into the classrooms was to never underestimate the difficulty of the task or the time required to significantly change the way learners learn or the way teachers teach. The reason for this difficulty is due, in part, to the fact that people, particularly the people most affected by a change or an innovation, are the most important factor in any change process. (p. 127)

Certainly, Hord, Rutherford, Huling-Austin, and Hall (1987) support Beavers (2001) contention that professional development, especially for an innovation as complex as computer technology, requires adequate funding and adequate time, coordination of the entities involved in professional development, and constant attention and revision. Such a commitment to those criteria has not been the accomplished at this time in the district isolated in the study, and the study's results reflect the literature's contention that such commitment has been rare in America's schools.

Recommendations

The review of the literature provided the context in this study for the inclusion of computer technology in America's schools and the investment that necessitated such inclusion. The findings of the study supported the research in the literature that technology inclusion in America's schools was expensive. The findings in this study also supported the research in the literature that few school districts planned effectively for the inclusion of technology after the implementation stage. Usually, as noted in the literature, the consequences or desired outcomes of such inclusion were either not envisioned, or districts failed to meet the envisioned outcomes for a variety of reasons. Most important among those inhibiting factors were adequate funding and adequate time provided for technology professional development, as well as coordinated technology professional development. Specifically, the findings in this study indicated that although an adequate vision existed in the district's initial technology plan, the goals of that plan were not achieved during FYs 1999-2001. The lack of adequate funding, the lack of adequate time, and the lack of coordinating technology professional development for district educators contributed to the district's inability to meet the goals of its vision. Not all was the fault of the district, however. Funding will continue to be necessary to affect changes in student outcomes with technology inclusion in America's schools and the district in this study, adequate funding that thus far has not been allocated for technology inclusion after implementation. The enormous investment in technology implementation needs to be at least matched for technology professional development after implementation. Given the nation's most recent budget crisis and the state's most recent budget crisis, such funding does not appear likely in the near future.

Numerous suggestions from the literature correlated easily to the findings in this study. Those correlations might assist the school district isolated for this study and might assist school districts across Oklahoma and the nation to pursue the effective use of the implemented technology after the technological infrastructure has been included.

1. First and foremost, the fidelity of implementation issue brought to the forefront by researchers (Fullan & Pomfret, 1977; Hall & Loucks, 1978,1977; Hord, Rutherford, Huling-Austin, & Hall, 1987) should be basic background information for any school district instituting any innovation. Such research provides a sound basis for implementation problems, developments, and directions.

   For this study, the fidelity issue in regard to the implementation of computer technology and the effective use of computer technology after implementation were not resolved. Barriers such as the time and funding necessary to address the fidelity of implementation issue were sometimes out of the district's control as funding from the state was limited. Though attempts were made, fidelity had not been achieved.

1. As noted in the literature on change theory, change agents are primarily responsible for the effective use of an implemented innovation. America's school administrators must not only be aware of the attention an innovation demands to fulfill the goals attached to such an innovation's implementation. They must also understand who is ultimately responsible foe such changes and include them in the decision making process for inclusion. To accomplish that, an understanding of change theory is vital.

For this study, the district should invite all stakeholders or change agents into the decision making process for technology inclusion. As the literature and the study's findings indicated, such inclusion is a must for the success of any innovation including the implementation of computer technology.

1. A technology plan should be a prerequisite for technology inclusion in a school district. The plan, however, should adhere to the principles outlined by the United States Department of Education and the principles outlined by a state's department of education. The plan should also relate to both research and data driven suggestions in the literature that reflect a successful technology plan and successful technology inclusion. A technology vision, planning and strategies for professional development, and possible funding sources should be included in the plan. The plan should be put into effect with a coordinated effort among the various levels in a district. If student outcomes are to be affected, educators need a plan, need to be part of that plan, and need professional development that helps make that plan successful. Attention should also be paid to those aspects of educational change that would reflect negatively on such a plan. Changes in

administration and staff over time, funding, and the time provided to implement the goals of a technology vision should all be taken into consideration. In other words, a district's plan should take precedence over other contributing factors that might change or affect the plan. As such, the plan should be revisited and evaluated on a continual basis to ensure that a district remains on target in regard to its intent. If not on target, adjustments and changes in strategies should be instituted to again focus a district's direction.

For this study, the district's initial technology plan was structured as the above recommendation suggests. However, either the initial plan was not revisited or the district was not able to pay attention to the plan due to budget concerns. Also of concern was the apparent lack of coordination among the various levels in the district to institute the technology plan. Such coordination is a necessity to harness both the limited funds and limited time available for technology inclusion.

1. Technology professional development should be constant, structured, coordinated, and tied to outcomes delineated in a technology plan's vision and goals. Such technology professional development should be embedded in a district's direction toward technology inclusion so educators use the technology to communicate, grade, record, expand upon content and curriculum, and in general make the technology an appendage to everyday educational tasks. Also, the purpose of the implemented technology must be made aware to educators, as must the training.

For this study, the district should initially employ a top-down strategy to coordinate professional development strategies for computer technology inclusion that adheres to the guidelines reflected in its technology plan. Those strategies should reflect the constancy, structure, and coordination among the stakeholders necessary for successful inclusion to enhance student outcomes in technology use. The district must also pay attention to the embedded use of the technology for its educators: email, websites, bulletin boards, and online syllabi are a few examples of embedded technology use.

1. Districts need to determine a balance between the funding needed for the implementation of technology and the funding needed for technology professional development. Both are essential. If only one side of the equation is attended to, the purpose of technology inclusion has missed the mark. If attention is not paid to technology professional development after implementation, educators may not use the technology properly. If district goals for the use of the implemented technology are not outlined and reflected in technology professional development for district educators, how can district educators meet district demands?

For this study, such clarity between district goals and educator implementation of the goals were certainly problems the district isolated in this study had. Difficulty in structuring such a balance was certainly due in part to funding restrictions. However, an apparent lack of coordination to utilize the time and funding the district did have was also indicated, as was the voluntary nature of district educator technology training. That training should become mandatory and not voluntary. This move would certainly support the contention in the literature that the key to success of any innovation in education is the educator. The educator is also responsible for student outcomes in regard to an innovation. These changes would provide district educators with the understanding that the investment in technology is being taken seriously and is a priority.

1. Educator concerns like those isolated by the SoCQ should be addressed in regard to the inclusion of computer technology. Changes in an educator's approach to incorporating an innovation such as computer technology were shown to be important in the literature (Hall, George, & Rutherford, 1998; Hord, Rutherford, Huling-Austin, & Hall, 1987). Continually identifying educator concerns to determine improvement and advancement toward district technology goals should help develop technology professional development that ensures the goals outlined in a technology vision. Educator concerns and educator levels of technology expertise should drive technology professional development. So should data driven studies from the literature like Cross' (1981) study that identified adult learners as fearful of further education because of situational, institutional, and dispositional barriers.

For this study, district educators through the SoCQ reflected their need for more information about technology, their need to understand its purpose in the district, and their need to know how it will impact educators and students. These results provided a legend on the map of technology inclusion in the district. If the idea is to impact student outcomes, the district should begin with this information in its technology professional development strategies, articulate how the technology will be utilized, and move its educators to impact student outcomes. Constant reassessment is important. Such reassessment should keep in mind the complexities introduced with change and how adults learn.

1. Strategies that reflect how adults learn must be included in an innovation's inclusion. If school districts pay attention to planning and to a vision that addresses educator concerns, such attention to adult learning strategies could help devise and direct professional development strategies toward the effective use of the innovation ((Brookfield, 1990; Cross, 1981; Houle, 1980, 1972), especially if such attention helps educators overcome internal and external barriers to learning (Brookfield, 1990; Cross, 1981).

For this study, although the district had included adult learning considerations into its initial technology plan, such attention was not provided concrete outlets in professional development sessions. Such attention and direction needs to be revisited and employed.

Implications for Future Research

This study focused on the inclusion of technology in one school district in southwest Oklahoma. The focus of the study was to determine if fidelity of implementation of the technology in the district had been accomplished. Factors influencing such fidelity were considered in the analysis. Given the monetary investment in implementation, had the district prepared to effectively harness that technology after implementation? Numerous district artifacts including budgets, technology plans, and professional development strategies were considered. The study's findings raised or reiterated several questions or issues that might be considered for further research.

1. Fidelity of implementation should be examined in other school districts in a variety of settings to determine whether the investment in computer technology has yielded its intended outcomes. Researchers might approach other districts in a similar fashion or utilize whatever technology plan(s) were available to determine just how school districts were using their implemented technology.
1. Studies should investigate the legislative process to determine how and why such educational funding shortsightedness continues. Funding for education continues to be a problem nationally. As this study indicated, far too little financial investment went to technology professional development for the district in this study after implementation. Rhetoric at the national level and the state level continue to suggest the importance of technology and how it might transform the traditional classroom to an anytime, anywhere laboratory for education. Yet, funding continues to be invested primarily in implementation, and attention was lacking in funding for technology professional development.
1. The SoCQ utilized in this study provided pertinent information on educator concerns in the district. Studies in other districts could be provided similar educator concerns to determine technology professional development strategies that link a district vision to district intended outcomes for technology inclusion. Longitudinal studies that continue to focus on educator concerns over time and how those concerns have impacted educator technology teaching practices might provide insightful information as to effective strategies and procedures for educator success in technology inclusion.

1. The SoCQ isolated district educator concerns. Studies should also include educator levels of expertise in regard to technology. Where do educator strengths and weaknesses lie in regard to district goals for implementation? Specific technology training regimens might be formulated to correlate to educator concerns and level of expertise. Isolating district educator specific skills with technology might help the district develop more effective technology professional development strategies.
1. Studies that reflect administrative direction in districts that have been successful in technology inclusion should be done, and these should be reflected in university training programs for administrators. Such a financial investment such as technology inclusion deserves the needed attention from administration. Administrative training programs that provide insight into the complexity of technology inclusion should be considered. Comparison studies may be in order as well as case studies in districts that have connected outcomes for technology inclusion to their implementation of technology to determine the strategies that were effective in such districts.
1. Qualitative studies that assess district implementation of technology might provide deeper insight into educator concerns and technology use.

Although these recommendations for future research into the inclusion of computer technology in America's schools are broad in perspective, many individual approaches to the effects of technology inclusion are possible in their scope. Researchers should continue to focus emphasis on fidelity issues in regard to technology inclusion as those issues create new problems for education and continue to bolster others. The expense of such an investment in technology necessitates such attention, as does the perception that the profession of education attempts to include so many diverse methods of enhancing the educational process that few are provided the attention they need to succeed. The literature reflected that perception about innovations in education. The literature and the mainstream American media continued to reflect the perception that education is expensive, and the desired results of previous innovations in education were minimal compared to the investments. Given the financial investment in technology inclusion, accountability and fidelity of implementation should not be taken for granted.

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APPENDIX A

Southwest Educational Development

Laboratory (SEDL) Permission to use Materials

memorandum

SOUTHWEST EDUCATIONAL DEVELOPMENT LABORATORY, 211 EAST 7TH STREET, AUSTIN, TEXAS 78701-3281

TO: Gil Hernandez
Assistant Professor, Cameron University

FROM: Joyce S. Pollard, Ed.D.
Director, Office of Institutional Communications

SUBJECT: Permission to reprint and distribute SEDL materials

DATE: February 20, 2002

Thank you for your interest in using the "***Stages of Concern Questionnaire***" distributed by the Southwest Educational Development Laboratory (SEDL).

SEDL is pleased to grant permission for use of the material cited above for the purpose of: one-time reprinting and distribution for educational, non-profit use only. Meeting the following conditions shall constitute your permission to use the material cited above. This permission shall terminate if the conditions of this agreement are not met.

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Please sign below, indicating that you understand and agree to comply with the above conditions, and send the original back to us. A duplicate of this agreement will be sent to you via return mail.

Signature: Norbert G. Hernandez Printed Name: Norbert G. Hernandez

Date signed: 2/22/02

Thank you again for your interest in SEDL's materials. If you have questions, please contact Marian Nelson or me at (800) 476-6861.

APPENDIX B

District Information Materials

Principals' Meeting
Tuesday, April 16, 2002

Agenda

a. Gil Hernandez; Assistant Professor; Cameron University.

b. Study: Collaborative study to determine teacher and administrator levels of concern about computer technology implementation.

   1) Dissertation topic.
   2) Professional development strategies for LPS.

a. Stages of Concern Questionnaire (SoCQ):

   The Stages of Concern About the Innovation Questionnaire is the result of three and one-half years of research and development, including extensive study of individuals involved in "change" in both schools and universities. Based on teacher concerns research conducted by Frances Fuller in the 1960's, Stages of Concern are a primary dimension of the Concerns-Based Adoption Model, a model developed at the Texas R&D Center to conceptualize and facilitate educational change. The Stages of Concern Questionnaire (SoCQ) was developed to assess the seven hypothesized Stages of Concern About the Innovation (Hall, George, & Rutherord, 1998).

b. Demographic items:

   Gender, age, educational level, years of employment, years of computer use, teacher/administrator, elementary/secondary.

c. Participant anonymity.

d. Questions?

Dear Principal,

Enclosed you will find copies for each of your teachers and/or administrators in your building from the district Superintendent explaining the collaborative research study between the district and the University of Oklahoma-Norman campus.

As explained in the principal's meeting at the district Board of Education on April 16, the study will attempt to address professional development strategies for the district as a result of survey participation by administrators and teachers. As such, I would certainly appreciate your help in making sure everyone in your building who qualifies to take the survey receives this initial notification as soon as possible.

A second letter of explanation, survey materials, and survey instructions will be delivered prior to May 24, the district parent-teacher conference.

If you have any additional questions about this project at any time, please feel free to contact me at 580.581.2927 (work), 580.536.2648 (home), or gilh@cameron.edu. You may also contact my University of Oklahoma-Norman campus supervisor, Dr. Jeffrey Maiden, at 405.325.1524 or jmaiden@ou.edu.

Thank you for helping with this study.

Sincerely,
Gil Hernandez

Assistant Professor

April 30, 2002

Dear Administrator and/or Teacher:

The District is pleased to participate in a collaborative research study with the University of Oklahoma-Norman campus. The study, which relates to computer technology implementation and professional development, will be conduced by Gil Hernandez, assistant professor at Cameron University, in association with Dr. Jeffrey Maiden, associate professor at the University of Oklahoma-Norman campus.

Mr. Hernandez is conducting this research in partial fulfillment for his requirements toward a Ph.D. in Educational Administration, Curriculum, and Supervision at the University of Oklahoma-Norman campus. The District will have access to the generated data in order to help identify administrator and teacher concerns with regard to the implementation of computer technology. It is hoped that the data will allow the District to determine better-suited professional development strategies for its administrators and teachers.

A 35-item instrument called the Stages of Concern Questionnaire (SoCQ) will be administered to administrators and teachers in the District willing to participate in this study during the parent-teacher conference day on May 24, 2002. Other than the survey itself, only a participant's work site and demographic information that focuses on gender, age, years of teaching experience, and level of education will be noted in the study to help determine specific professional development strategies in the area of computer technology. There are no foreseeable risks of participation in this project for you. Your participation in this project is strictly voluntary, and should you elect not to participate in the project, there is no penalty. The survey should take approximately 15 minutes to complete.

Survey results garnered from you will be kept in a secure place by Mr. Hernandez, the principal investigator in the study, and will remain confidential within the limits of the law. The materials garnered will be destroyed at the conclusion of the study. To maintain anonymity, participants will not be noted by any identifying characteristics in this research, and the results of this study will not be used to evaluate any personnel. Only the participant's work site will be noted in the study to help determine specific professional development strategies in the area of computer technology. All responses will be completely anonymous.

However, since this study hopes to help determine professional development strategies for the administrators and teachers in the Lawton Public Schools, participation is urged. Please take the opportunity to participate in this study by completing the SoCQ on May 24, 2002 during parent-teacher conference day. By submitting the SoCQ you are agreeing to participate in the above described research.

If you have any additional questions about this project at any time, you may contact Mr. Hernandez at 580.581.2927 (work), 580.536.2648 (home), or gilh@cameron.edu. You may also contact Mr. Hernandez's University of Oklahoma-Norman campus supervisor, Dr. Jeffrey Maiden, at 405.325.1524.

Thanks for your assistance.

Superintendent of Schools

Dear Principal and/or Administrator,

Enclosed you will find copies of a letter from the Superintendent of the district for each of your teachers and/or administrators in your building, reiterating the collaborative research study between the district and the University of Oklahoma-Norman campus.

Also, after the Superintendent's letter, participants in the study will find three additional pages that comprise an explanation of the Stages of Concern Questionnaire (SoCQ), the demographics to be included in the study, and the 35 item SoCQ. **Please make sure that participants understand that the last three pages of the included materials must be completed in order to be considered in the study.** As indicated in the letter from the Superintendent, the survey is to be conducted on Friday, May 24. We would appreciate your help in reminding your staff of the opportunity to participate in this collaborative study.

In the upper right hand corner of this letter, you will find a return address for the materials. Would you please collate all the completed surveys and those left uncompleted in the envelope in which the materials arrived, tape the envelope shut, place the return address over the original address, and return it through district distribution.

If you have any additional questions about this project at any time, please feel free to contact me at 580.581.2927 (work), 580.536.2648 (home), or gilh@cameron.edu. You may also contact my University of Oklahoma-Norman campus supervisor, Dr. Jeffrey Maiden, at 405.325.1524 or jmaiden@ou.edu.

Thank you for helping with this study.

Sincerely,
Gil Hernandez

Assistant Professor

May 24, 2002

Dear Administrator and/or Teacher:

Recently, you should have received notification that the District is participating in a collaborative research study with the University of Oklahoma-Norman campus. The study, which relates to computer technology implementation and professional development, is being conduced by Gil Hernandez, assistant professor at Cameron University and principal investigator in the study, in association with Dr. Jeffrey Maiden, associate professor at the University of Oklahoma-Norman campus.

Mr. Hernandez is conducting this research in partial fulfillment for his requirements toward a Ph.D. in Educational Administration, Curriculum, and Supervision at the University of Oklahoma-Norman campus. The District will have access to the generated data in order to help identify administrator and teacher concerns with regard to the implementation of computer technology. It is hoped that the data will allow our District to determine better-suited professional development strategies for our administrators and teachers.

Today, you are asked to respond to a 35-item instrument called the Stages of Concern Questionnaire (SoCQ) in order to address concerns about computer technology implementation in the District. Other than the survey itself, only a participant's work site and demographic information that focuses on gender, age, years of teaching experience, and level of education will be noted in the study to help determine specific professional development strategies in the area of computer technology. As noted in the previous letter, there are no foreseeable risks of participation in this project for you. Your participation is strictly voluntary. Should you elect not to participate in the project, there is no penalty. The survey should take approximately 15 minutes to complete.

Survey results garnered from you will be kept in a secure place by Mr. Hernandez and will remain confidential within the limits of the law. Survey materials will be destroyed at the conclusion of the study. To maintain anonymity, participants will not be noted by any identifying characteristics in this research, and the results of this study will not be used to evaluate any personnel. All responses are completely anonymous.

Since this study hopes to help determine professional development strategies for administrators and teachers in the District, participation is urged. Today, please take the opportunity to participate by completing the SoCQ sometime during our parent-teacher conference day. By submitting the SoCQ you are agreeing to participate in the above described research.

If you have any additional questions about this project at any time, you may contact Mr. Hernandez at 580.581.2927 (work), 580.536.2648 (home), or gilh@cameron.edu. You may also contact Mr. Hernandez's University of Oklahoma-Norman campus supervisor, Dr. Jeffrey Maiden, at 405.325.1524.

Thanks for your assistance.

Superintendent of Schools

APPENDIX C

District Stages of Concern Questionnaire (SoCQ)

Stages of Concern Questionnaire

This questionnaire will take approximately 15 minutes to complete. The site number below identifies your particular school. The number refers to the survey you will complete. Keep track of both the site number and the survey number if you desire individual feedback.

Site ___ Number________

The purpose of this questionnaire is to determine what people who are using or thinking about using various programs are concerned about at various times during the innovation adoption process. The items were developed from typical responses of school and college teachers who ranged from no knowledge at all about various program to many years experience in using them. Therefore, a good part of the items on this Questionnaire may appear to be of little relevance or irrelevant to you at this time. For the completely irrelevant items, please circle "0" on the scale. Other items will represent those concerns you do have, in varying degrees of intensity, and should be marked higher on the scale.

For example:

This statement is very true of me at this time.	0 1 2 3 4 5 6 7
This statement is somewhat true of me now.	0 1 2 3 4 5 6 7
This statement is not at all true of me at this time.	0 1 2 3 4 5 6 7
This statement seems irrelevant to me.	0 1 2 3 4 5 6 7

Please respond to the items in terms of your present concerns, or how you feel about your involvement or potential involvement with the implementation of computer technology. We do not hold to any one definition of this innovation, so please think of it in terms of your own perception of what it involves. Since this questionnaire is used for a variety of innovations, the name implementation of computer technology never appears. However, phrases such as "the innovation," "this approach," and "the new system" all refer to the implementation of computer technology. Remember to respond to each item in terms of your present concerns about your involvement or potential involvement with the implementation of computer technology.

Thank you for taking time to complete this task.

Please begin by completing the following demographic items by placing a check mark in the appropriate area and then continue with the 35 item Stages of Concern Questionnaire:

Age: 20-29__ 30-39__ 40-49__ 50-59__ 60-69__ 70-79__

Male:_________ Female:_______

Highest Degree Earned: Bachelor_______Masters________Doctorate_______

Years Teaching Experience: 0-5____6-10____11-15___16-20___21-25___26-30___31-35___36-40
_______41-45___

Years Computer Experience: 0-5____6-10____11-15___16-20___21-25___26-30___31-35___36-40
_______41-45___

0	1	2	3	4	5	6	7
Irrelevant		Not true of me now		Somewhat true of me now		Very true of me now	

1. I am concerned about students' attitudes toward this innovation.	0 1 2 3 4 5 6 7
2. I now know of some other approaches that might work better.	0 1 2 3 4 5 6 7
3. I do not even know what the innovation is.	0 1 2 3 4 5 6 7
4. I am concerned about not having enough time to organize myself each day.	0 1 2 3 4 5 6 7
5. I would like to help other faculty in their use of the innovation.	0 1 2 3 4 5 6 7
6. I have a very limited knowledge about the innovation.	0 1 2 3 4 5 6 7
7. I would like to know the effect of reorganization on my professional status.	0 1 2 3 4 5 6 7
8. I am concerned about conflict between my interests and my responsibilities.	0 1 2 3 4 5 6 7
9. I am concerned about revising my use of the innovation.	0 1 2 3 4 5 6 7
10. I would like to develop working relationships with both our faculty and outside faculty using this innovation.	0 1 2 3 4 5 6 7
11. I am concerned about how the innovation affects students.	0 1 2 3 4 5 6 7
12. I am not concerned about this innovation.	0 1 2 3 4 5 6 7
13. I would like to know who will make the decisions in the new system.	0 1 2 3 4 5 6 7
14. I would like to discuss the possibility of using the innovation.	0 1 2 3 4 5 6 7

15. I would like to know what resources are available if we decide to adopt this innovation.	0 1 2 3 4 5 6 7
16. I am concerned about my inability to manage all the innovation requires.	0 1 2 3 4 5 6 7
17. I would like to know how my teaching or administration is supposed to change.	0 1 2 3 4 5 6 7
18. I would like to familiarize other departments or persons with the progress of this new approach.	0 1 2 3 4 5 6 7
19. I am concerned about evaluating my impact on students.	0 1 2 3 4 5 6 7
20. I would like to revise the innovation's instructional approach.	0 1 2 3 4 5 6 7
21. I am completely occupied with other things.	0 1 2 3 4 5 6 7
22. I would like to modify our use of the innovation based on the experiences of our students.	0 1 2 3 4 5 6 7
23. Although I do not know about this innovation, I am concerned about things in the area.	0 1 2 3 4 5 6 7
24. I would like to excite my students about their part in this approach.	0 1 2 3 4 5 6 7
25. I am concerned about time spent working with nonacademic problems related to this innovation.	0 1 2 3 4 5 6 7
26. I would like to know what the use of the innovation will require in the immediate future.	0 1 2 3 4 5 6 7
27. I would like to coordinate my effort with others to maximize the innovation's effects.	0 1 2 3 4 5 6 7
28. I would like to have more information on time and energy commitments required by this innovation.	0 1 2 3 4 5 6 7
29. I would like to know what other faculty are doing in this area.	0 1 2 3 4 5 6 7
30. At this time, I am not interested in learning about the innovation.	0 1 2 3 4 5 6 7
31. I would like to determine how to supplement, enhance, or replace the innovation.	0 1 2 3 4 5 6 7

32. I would like to use feedback from students to change the program. 0 1 2 3 4 5 6 7

33. I would like to know how my role will change when I am using the innovation. 0 1 2 3 4 5 6 7

34. Coordination of tasks and people is taking too much of my time. 0 1 2 3 4 5 6 7

35. I would like to know how this innovation is better than what we have now. 0 1 2 3 4 5 6 7

SoCQ: Item Numbers and Statements in Stages of Concern

Item Number	Statement
	Stage 0
3	I do not even know what the innovation is.
12	I am not concerned about this innovation.
21	I am completely occupied with other things.
23	Although I do not know about this innovation, I am concerned about things in the area.
30	At this time, I am not interested in learning about the innovation.
	Stage 1
6	I have a very limited knowledge about the innovation.
14.	I would like to discuss the possibility of using the innovation.
15	I would like to know what resources are available if we decide to adopt this innovation.
26	I would like to know what the use of the innovation will require in the immediate future.
35	I would like to know how this innovation is better than what we have now.
	Stage 2
7	I would like to know the effect of reorganization on my professional status.
13	I would like to know who will make the decisions in the new system.
17	I would like to know how my teaching or administration is supposed to change.
28	I would like to have more information on time and energy commitments required by this innovation.

33	I would like to know how my role will change when I am using the innovation.

Stage 3

4	I am concerned about not having enough time to organize myself each day.
8	I am concerned about conflict between my interests and my responsibilities.
16	I am concerned about my inability to manage all the innovation requires.
25	I am concerned about time spent working with nonacademic problems related to this innovation.
34	Coordination of tasks and people is taking too much of my time.

Stage 4

1	I am concerned about students' attitudes toward this innovation.
11	I am concerned about how the innovation affects students.
19	I am concerned about evaluating my impact on students.
24	I would like to excite my students about their part in this approach.
32	I would like to use feedback from students to change the program.

Stage 5

5	I would like to help other faculty in their use of the innovation.
10	I would like to develop working relationships with both our faculty and outside faculty using this innovation.
18	I would like to familiarize other departments or persons with the progress of this new approach.
27	I would like to coordinate my effort with others to maximize the innovation's effects.
29	I would like to know what other faculty are doing in this area.

Stage 6

2	I now know of some other approaches that might work better.
9	I am concerned about revising my use of the innovation.
20	I would like to revise the innovation's instructional approach.
22	I would like to modify our use of the innovation based on the experiences of our students.
31	I would like to determine how to supplement, enhance, or replace the innovation.

APPENDIX D

Approval Letter for Study

Institutional Review Board – Norman Campus

The University of Oklahoma

OFFICE OF RESEARCH ADMINISTRATION

March 29, 2002

Mr. Norbert G. Hernandez
6915 N.W. Eisenhower Dr.
Lawton, OK 73505

Dear Mr. Hernandez:

Your research application, "The Importance of a Professional Development Strategy When Implementing Computer Technology: A Fidelity of Implementation Study," has been reviewed according to the policies of the Institutional Review Board chaired by Dr. E. Laurette Taylor, and found to be exempt from the requirements for full board review. Your project is approved under the regulations of the University of Oklahoma - Norman Campus Policies and Procedures for the Protection of Human Subjects in Research Activities.

Should you wish to deviate from the described protocol or the research is to extend beyond 12 months, you must notify this office, in writing, noting any changes or revisions in the protocol and/or informed consent document, and obtain prior approval or request an extension of this ruling. A copy of the approved informed consent document is attached.

Should you have any questions, please contact me at irb@ou.edu.

Sincerely,

Susan Wyatt Sedwick

Susan Wyatt Sedwick, Ph.D.
Director of the Office of Research Administration and
Administrative Officer for the
Institutional Review Board – Norman Campus (MPA #1146)

SWS:lk
FY2002-311

cc: Dr. E. Laurette Taylor, Chair, Institutional Review Board
Dr. Jeffrey Maiden, Education