6-1999

# A Descriptive Analysis of Factors Related to the Effectiveness of Educational Technology Implementations in Poorer, Rural School Districts

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# A DESCRIPTIVE ANALYSIS OF FACTORS RELATED TO THE EFFECTIVENESS OF EDUCATIONAL TECHNOLOGY IMPLEMENTATIONS IN POORER, RURAL SCHOOL DISTRICTS

by

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**MASTERS THESIS**
Submitted to the
Faculty of the School of Education
Advanced Studies in Education
for the
Degree of Master of Education

Grand Valley State University

June 1999

## ACKNOWLEDGEMENTS

I could not have completed this thesis without the help and support of several people. I specifically would like to thank my advising professor, Dr. Sherrill Pryor, for all of her patience and invaluable advice throughout not only this thesis, but also my graduate career at Grand Valley State University. I thank my friend and mentor, Dr. Patrick Bird, for proofing several drafts of the manuscript, as well as encouraging me during the course of this work. Finally, I would like to thank my staff and colleagues at Bangor Public Schools for giving me the support and time I needed to finish this work.

Daniel J. Vomastek

## ABSTRACT

As the use of educational technology in our classrooms continues to increase, schools must take every reasonable step they can to ensure the time and money invested in educational technology is not wasted. This is especially true in poorer, rural school districts that do not always have the money and personnel that larger, more affluent school districts have access to. These poorer, rural schools must take extra precautions to ensure their investment of limited resources has the greatest gain possible.

The goal of this thesis was to identify those specific factors related to the effectiveness of educational technology implementations to which poorer, rural school districts must pay added attention. This work began with an extensive review of the existing literature on the effective use of educational technology. This review was followed by a survey of several poorer, rural school districts throughout Southwest Michigan. These surveys asked school districts for their insights into important factors related to the effectiveness of educational technology implementations as based upon their own successes and failures.

In the end, this research found that poorer, rural schools and their larger, more affluent counterparts share the majority of these factors, but some of the factors take on added importance for the poorer, rural school.

# TABLE OF CONTENTS

**DATA FORM**

# CHAPTER ONE
# THESIS PROPOSAL

## Problem Proposal

Although schools are spending significant portions of their annual budget on educational technology, the technology purchased often does not live up to its promised benefits. In fact, some educational research has shown this to be the case. A recent Educational Testing Service (ETS) study found a type of educational technology that actually lowered academic performance in certain environments (Wenglinsky, 1998).

In a letter to D'Ignazio & D'Ignazio (1998), Ted Kahn states the problem is not so much the educational technology itself, as much as how it is used. Computers often remain unused, as teachers and students do not have the prerequisite knowledge and training to use them effectively (Conte, 1998). In the same letter to D'Ignazio & D'Ignazio, Kahn also states when computers and other technologies are used, it is sometimes the case that so many restrictions are put on their use that the educational value of the technology becomes severely restricted. Educational technology is often reduced to drill and practice applications, or worse, a new form of an electronic baby-sitter for the teacher unwilling to put forth the effort to use the technology properly (Pepi & Scheurman, 1996). Consequently, some fear the promise of educational technology is nothing more than a hoax (D'Ignazio & D'Ignazio, 1998) or diversion

(Conte, 1998). Schools cannot ignore the importance of educational technology, especially in today's technology driven society, but they must take steps to ensure the educational technology brought into their districts functions as it should and achieves the desired results.

## Importance and Rationale of Study

Nationally, school districts continue to spend significant amounts of operating and bond revenue to fund educational technology purchases. Some estimates place current expenditures at $4 billion a year (Conte, 1998). If the educational technology purchased does not deliver on its intended goal, the money spent is wasted. Take the money spent on drill and practice software in the before mentioned ETS study as an example. Wenglinsky (1998) found that 8th grade students using drill and practice software scored an average of 0.59 grade levels lower on the National Assessment of Educational Progress (NAEP) test than those 8th graders not using drill and practice software.

Wasted money, such as in the above example, can be a significant loss to school districts, especially when technology is purchased at the sacrifice of other school programs, building repairs and maintenance, and other competing issues (Conte, 1998). This concern is especially urgent in poorer, rural school districts which often lack either the funds more affluent schools have access to or the business partnerships readily

available to urban schools. In the writer's own school, money which could be used to renovate crowded, older buildings or hire additional staff has been temporarily diverted to capital outlay dollars for the purchase of technology with the hope that the successful passage of a bond referendum will provide the dollars needed to alleviate the before mentioned concerns. Rural schools also often lack the specialized coordinators and administrators found in larger urban schools (Mann, Kitchens, & Aylor, 1991), and as such find it even harder to ensure the educational technology present in the district is being used to its fullest.

In addition to money, time is also diverted from competing needs and activities as educational technology is introduced into school environments. As a result, some existing curriculum is often cut back or removed altogether. If the educational technology introduced does not fulfill its promise, in the end much will have been sacrificed for little gain.

## Background of Study

Traditionally, it has been important to be literate in the basics of reading, writing, and mathematics. Today, we see the definition of literacy being expanded to contain a technological literacy as well (Pepi & Scheurman, 1996). This has created a sense of urgency for schools, as well as a surge of technology spending. By the year 2005, total new purchases and ongoing operating expenses could be as high as $61 billion dollars

(Conte, 1998). As schools rush to be technologically current, the process of integrating technology into schools often stops with the initial purchase of the technology. Educators have a history of seeking out the latest educational trends (Pepi & Scheurman, 1996), and often change to a new trend before following through on the current one. As a result, the initial wave of excitement and talk of educational change gives way to a sober realization of limited success (Cuban, 1995).

This lack of success can be attributed to a variety of factors. Often, new technology is purchased but ongoing repairs and maintenance are not included in the school's budget, leaving broken, but repairable, equipment unused (Wagschal, 1986). In the case of computer technology, regular upgrades and replacements are often ignored, leading to large collections of obsolete equipment (Cuban, 1995). Cuban (1995) also asserts that which is common sense: the teacher is the ultimate "gatekeeper" of what occurs in the classroom. Adequate training is often neglected by school districts with the hope that the proper classroom use of the technology will either be obvious (Wagschal, 1986) or that teachers will take it upon themselves to find out. As this is often not the case, the technology is seldom used to its potential. It can also be difficult to convince teachers of the importance of technology in today's society, and thus its importance in our schools. In these circumstances, teachers themselves can become

barriers to an effective educational technology program in their schools (Wagschal, 1986).

At times, educational technology is also given more credit than it is due. As educators, we want to believe in a panacea for our educational woes. Even though educational technology should not be viewed this way (McCormick & McCormick, 1982), it often is; and more fundamental problems in schools are ignored (Pepi & Scheurman, 1996). In this case, the educational technology will fail to succeed simply because of the unrealistic expectations that existed when the educational technology was introduced. These unrealistic expectations can also lead to an overuse of educational technology. As Pepi and Scheurman (1996) point out, while water is good for humans, too much water is bad.

## Statement of Purpose

The focus of this descriptive research was to develop a specific set of guidelines which poorer, rural schools, and specifically the school where the writer works, can use to ensure the effectiveness of their educational technology implementations. This research was completed in three phases. First, a review of the current literature dealing with effective educational technology implementations was conducted. Second, the writer developed a questionnaire on effective technology implementations that was based on the literature reviewed. Finally, the writer mailed the

questionnaire to technology coordinators and/or other school administrators in several rural Southwest Michigan school districts. Two weeks after the initial mailing, the writer mailed reminders to the schools that had not already responded. This step was repeated until the goal of a return rate of 65% or greater was met. Southwest Michigan was defined in this study to include Allegan, Berrian, Cass, and VanBuren counties. Rural was defined as those schools having an enrollment of not more than 2000 students and a primary service area population of not more that 10,000 persons, both as reported by the Michigan Department of Education. This research further restricted the selection of schools to those schools with a gross total revenue per pupil that is lower than the state average, again as reported by the Michigan Department of Education. The reason for this is twofold. First, schools in urban areas often have access to business and university partnerships that rural schools do not. Second, while the effective use of educational technology is important to all schools, it is especially important to schools where technology funding via capital outlay is limited. Because of the descriptive nature of this research, no variables were manipulated during the course of the study.

The results of the questionnaires were analyzed for common factors related to ensuring the effectiveness of educational technology initiatives.

While each school district is unique, the writer did expect to find common factors behind the success of the various educational technology initiatives, as well as behind some of the failures. Once these common factors were identified, they were compiled and presented as a concise, practical guide that poorer, rural schools could follow.

As the literature review showed, studies and other works related to underlying factors in the success of educational technology implementations are not unique. However, the literature review also showed that the information available is, for the most part, generic in nature. Because this work searched for specific factors that poorer, rural schools need to focus on in order to ensure effectiveness, its contribution to the body of existing work is unique.

The guide which was created during this research will be used by the writer as he reviews existing educational technology implementations in his own school district, as well as during planning for new ones. If the guidelines contained within the final product are valid, they should help the writer to identify why some of the educational technology implementations within his district have not worked as well as initially hoped, and provide suggestions for improving the effectiveness of those implementations. Additionally, this guide should provide valuable information that the writer can use to ensure the effectiveness of future

educational technology implementations within his district. In the end, if the guide proves as valuable as hoped, the writer will seek to distribute it via publication or other methods.

## Limitations

The biggest limitation of this research lies in the difficulty of defining what effectiveness is in the context of educational technology implementations. It was expected that each piece of literature reviewed, as well as each school district questioned, would have a unique definition of effectiveness.

Another significant limitation lies in the small number of schools surveyed. In fact, only 14 schools in the four counties surveyed met the selection criteria. While it is beyond the scope of this work to compile the data on a grander scale, it was expected that the small sample size would not prevent the research from yielding useful results. Depending on the outcome of this initial work, a larger, more formal, study may be warranted.

Because the research focused on poorer, rural schools, the guide which was developed may not be applicable to urban schools, or schools with greater available resources. However, the writer attempted to keep the guide general enough to be used by the widest possible audience without sacrificing its unique focus on the poorer, rural school.

## Definition of Key Terms

The key terms used throughout this work are defined below.

- Educational technology – technology used to deliver educational content to students either directly or indirectly.
- Southwest Michigan – the area contained within Allegan, Berrian, Cass, and VanBuren counties.
- Poorer – a school district with a gross total revenue per student that is less than the state average.
- Rural – any school district with a total enrollment of 2000 students or less and a primary service area population of 10,000 persons or less.

# CHAPTER TWO
# LITERATURE REVIEW

## Introduction

The literature review for this thesis began with an ERIC search of documents dated 1980 to the present and related to effective technology implementations. The results were few in number, and quite dated. As a result, the writer shifted the focus of the literature review to journal publications, and a wealth of materials related to the effectiveness of technology was found. Several authors discussed what they saw to be the keys of effective technology implementations. The overwhelming majority of the literature reviewed pointed to three specific things school districts must do: develop a technology plan, provide for faculty and staff development, and evaluate technology implementations on an ongoing basis.

## Technology Plans

The majority of the literature reviewed listed a well-written technology plan as the most important key to an effective implementation of technology. Vojtek and Vojtek (1998) stated that all successful implementations begin with a technology plan. Philosophically, technology plans should approach technology as part of the overall process of education, not as an isolated issue (Ocasio, 1995). Kearsley (1998)

further refined this thought by encouraging schools to avoid using technology to do the same things they already do now, but rather use technology to change the way they teach. The planning process should also make technology access equitable to all students (Ocasio, 1995).

Farrell and Gring (1993) also encouraged schools to make plans long-range versus short-range in nature. This long-range focus provides a context for reassessment of the technology plan. Farrell and Gring (1993) also stated that planing long-range encourages people to view technology implementations as a process, and not a quick fix. Finally, Farrell and Gring (1993) listed several guiding assumptions schools should consider while planning technology implementations, which include: technology is not a panacea, it is not a replacement for the basic components of teaching and learning, it is a tool with no single best use, and its power lies in how it meets the needs of children.

Including the Right People

Technology planning committees should include people who have the knowledge, ability, and power to make things happen (Winter, 1998). The committee should be broad based (5 Great Technology Plans, 1995), including administrators, teachers, support staff, parents, local business people, and students (Vojtek & Vojtek, 1998). Winter (1998) recommended keeping committees limited to twelve people, but she was

the only author reviewed that placed a size limit on technology planning committees.

Two different committee structures were presented. Farrell and Gring (1993) suggested breaking the technology planning committee into four subcommittees: curriculum and library; instructional materials; personnel and staff development; and policy, planning, and financing. Based on her observation of Madison Public Schools in Madison, CT, Ocasio (1995) suggested splitting the main planning group into subgroups that inventory existing technology and its use, specify technology learning outcomes for each grade level, develop ways of measuring the use of technology in the district, and ensure the goals contained in the plan are realistic.

Assessing Where You Are

After the technology planning committee is formed, the next step is to access the school district's present position in relation to technology and its use (Vojtek & Vojtek, 1998). Farrell and Gring (1993) stated this assessment should ask basic questions like why the committee exists, where the school district is, where the district wants to go and why, how the district will get there, and how will the district know when it is there. Farrell and Gring (1993) added to this assessment approach by suggesting that schools focus on their strengths, weaknesses, opportunities, and

threats. This assessment should also assess perceived future needs, as well as current ones (5 Great Technology Plans, 1995).

Setting Goals

After the assessment is complete, the next step in the planning process is objective or goal setting (Vojtek & Vojtek, 1998). Winter (1998) believes that setting good goals involves asking the right questions. For a specific objective, Winter (1998) stated these questions should include asking what the objective is, how progress will be measured, how students will be helped toward the objective, who is responsible for the objective, when the objective should be complete, and where the resources needed to meet the objective will be found.

Goals should be broad based but also be measurable over time (Farrell & Gring, 1993). They should also focus on higher uses of technology such as simulations versus lower ones such as word processing (Kearsley, 1998).

In 1998, the International Society for Technology in Education (ISTE) released a series of grade-specific curriculum-based technology goals for schools to include in their technology plans. Sample 9-12 goals include:

- Identify capabilities and limitations of contemporary and emerging technology resources and assess the potential of these

systems and services to address personal, lifelong learning, and workplace needs.

- Use technology tools and resources for managing and communicating personal/professional information (e.g., finances, schedules, addresses, purchases, correspondence).
- Routinely and efficiently use on-line information resources to meet needs for collaboration, research, publications, communications, and productivity. (p. 15)

Using Federal Guidelines

In order for schools to be eligible for some grants and other funds, school technology plans must meet certain federal, and in some cases state, guidelines (Golden, 1997). The Amended Elementary and Secondary Education Act of 1965, §3135, requires that school technology plans include, amongst other things, the following information: which technologies will be purchased along with how they will be integrated with existing technologies, how technology will be integrated into the curriculum, details on professional development and on-going training, projected timetable, projected cost, how parents and community members will be involved, and how the use of acquired technologies will be evaluated.

Other Planning Issues

Several other isolated technology planning tips were found during the literature review. In the April, 1995 issue of Electronic Learning it was strongly suggested that schools plan for ongoing repairs and maintenance, a suggestion with which Wagschal (1986) agreed. Also suggested in the April, 1995 issue of Electronic Learning was planning for special needs students, as well as defining all technology "jargon" used in the plan for the sake of community members who read it.

Wagschal (1986) encouraged school districts to consider teacher attitudes when planning and implementing new technology, as those attitudes have a direct effect of the potential success of any project. Finally, Fitzpatrick (1996) suggested including the criteria and processes that will be used in selecting hardware and software vendors.

## Professional Development

Nearly every piece of literature reviewed suggested that plans for professional development in the use of technology be included within the overall technology plan. It became clear during the literature review that this part of a school's technology plan is so vital to the success and effectiveness of technology initiatives, the writer decided to include it as a separate section.

Currently, the state of Michigan does have a set of entry level technology standards for pre-service teachers. However, Michigan does not require training in educational technology for those teachers seeking recertification, nor does Michigan provide any state organized programs for training in educational technology (Zehr, 1998). In spite of this, teachers in the state do report a level of training in educational technology that is consistent with the national average. Specifically, 83% of Michigan fourth grade teachers report having some training in educational technology between 1991 and 1996 compared to a national average of 81% (United Stated Department of Education [USDE], 1997). For eighth grade mathematics teachers, the reported average during the same period of time drops to 75% in Michigan, but the national average declines as well to a level of 76% (USDE, 1997).

Successful professional development plans will avoid assuming the connections between available technologies and a school's curriculum are easy to see (Moersch, 1995). Moersch (1995) also warned against assuming that teachers are willing to change their instructional practices. Rather, school districts should justify the use of educational technology using several measures (Moersch, 1995). School districts are encouraged to train teachers in the use of the technologies themselves, as usage is not always obvious (Wagschal, 1986). Kearsley (1998) suggested that training

should focus on how to teach with technology, and not stop with instruction on its use alone. In fact, a big failing of existing professional development in technology is its lack of connection with what the teachers actually teach (Zehr, 1997). As an example, 70% of Michigan eighth grade science teachers reported having had training in educational technology between 1991 and 1996 (USDE, 1997), but only 39% reported having training in topics covering material beyond basic use (USDE, 1996).

Zehr (1997) recommended that 30% of the dollars included in a technology plan be set aside for professional development. Zehr (1997) also recommended that teachers be involved in planning the professional development, and that the professional development be hands-on. Administrators should also be included in professional development as teachers should not be expected to utilize technology if their administrators do not (Golden, 1997).

Johnson (1999) listed thirteen specific technology competency goals for teachers to use as basic framework for the content of professional development in educational technology. Sample goals include: demonstrating the ability to use information technology and software; evaluating the use of specific technologies to support instruction; using educational technology in accordance with current instructional principles; demonstrating the ability to use technology in a problem

solving and data management context; demonstrating the ability to use multimedia applications; demonstrating the ability to use productivity software; demonstrating knowledge of ethical, legal, and human issues involving technology; and applying computers to encourage personal development of themselves and their students.

Professional development can take on several forms. Zehr (1997) listed several possibilities including regular in-house professional development, volunteer after-school training, teacher mentors and coaches, and release time. Zehr (1997) also stated that merit pay can be used to motivate teachers to learn about technology and its use in the classroom. Finally, whatever shape professional development takes, it should be ongoing in nature (5 Great Technology Plans, 1995).

## Ongoing Evaluation

The third major theme related to ensuring the effectiveness of educational technology implementations uncovered during the literature review is a regular and consistent evaluation of the technology implementation (Vojtek & Vojtek, 1998). However much evaluation was emphasized, little was actually said about how to conduct it. Kinnaman (1992) recommended the evaluation stay simple and focused. Kinnaman (1992) also suggested the evaluation be based on the original technology

plan itself, and that teachers and students using the technology be involved in the evaluation.

Kinnaman, along with Trotter (1998), both strongly advocated that standardized test scores not be used as a key indicator of the effectiveness of a given technology based effort. Computers and other technologies are often used in ways that standardized tests do not measure, e.g. for creative thinking or issues related to quality of thought (Trotter, 1998). Alternative measures of the effectiveness of technology can include performance assessments, and learner attitudes and behaviors such as motivation and interaction (Kinnaman, 1992). Effectiveness can also be measured by examining a student's problem solving ability, level of performed task complexity, ability to create complex products, mastery of a deeper content level, and attainment of higher level skills (Dede, 1998). School districts should also track the usage of educational technology (Carter, 1996). Carter (1996) also suggested that schools survey teachers and students on their reactions to specific technologies shortly after they have been used in the classroom.

The most specific information on evaluation was found in a 1995 article by Moersch. Moersch (1995) proposed a seven level framework for evaluating the levels of technology implementation within a school district. These seven levels are summarized as follows:

- Nonuse: there is little access to technology other that text-based technologies such as photocopiers, overhead projectors, etc.
- Awareness: technology is present but removed from classroom teacher. Examples of this level include integrated learning labs, pull-out programs, word processing labs, etc. Here, the use of technology has little or no connection to the curriculum taught in the classroom.
- Exploration: technology is used to supplement content presented in the classroom via tutorial programs, games, etc.
- Infusion: educational technology tools are used to "augment isolated instructional events" (p. 42) such as using databases and spreadsheets in conjunction with science experiments.
- Integration: similar to infusion in the types of educational technology used, but at this level educational technology is used not in isolated events, but rather it is present throughout a curriculum as a valuable tool for solving real-world problems.
- Expansion: technology is accessed beyond the classroom walls. Teachers seek out government, businesses, and other agents to expand their students learning of a major theme or concept.
- Refinement: technology is seen as a process, product, and tool that "provides a seamless medium for informational queries, problem solving, and/or product development" (p. 42). Students have

immediate access to technology and an understanding of how and when to use it.

## Other Concepts

Beyond the three major themes previously mentioned, the literature review uncovered other keys to follow, as well as pitfalls to avoid, in order to ensure effectiveness. Poftak (1999) strongly encouraged involving the community in all areas of school technology use, along with creating a sense of ownership for all the participants in the process. Salpeter (1999) recommended using technology to focus on collaborative, real-world learning as well as using authentic assessments wherever possible. McLester (1999) suggested advertising the use of technology within a school district as well as supplying as much in-house support as possible. This in-house support can be in the form of student leaders and student mentors when appropriate (Carter, 1996).

In terms of what not to do, Gust (1998) complied a list of twenty mistakes to not make during technology implementations. Some mistakes not previously mentioned from a positive perspective include: forgetting to plan for non-technology issues such as room size and electrical wiring, not planning for an adequate number of software licenses, not providing teachers with expectations for how technologies are to be used, attempting to save money by purchasing inadequate equipment, not planning for

initial defects, and not getting appropriate help from outside contractors. Finally, Stockdill and Morehouse (1992) stress that schools districts should monitor for learner isolation created by technology, and take the appropriate steps to alleviate that isolation.

## Conclusion

In summary, the literature review uncovered three key factors which need to be present in order to ensure effective educational technology initiatives: detailed planning (Farrell & Gring, 1993; Vojtek & Vojtek, 1998), professional development (Fitzpatrick, 1996; Moersch, 1995; Zehr, 1997), and ongoing evaluation (5 Great Technology Plans, 1995; Carter, 1996). When any of these factors are ignored, a school district runs the risk of having the money that they invested in educational technology becoming a waste (Conte, 1998; Farrell & Gring, 1993; Zehr, 1997).

Aside from these general ideas, what other specific factors underlie the effectiveness of technology implementations in poorer, rural school districts? Additionally, while the literature review uncovered several specific factors related to technology planning, comparatively fewer specific factors regarding professional development were given. Even less was said in regards to the ongoing evaluation of educational technology implementations. What specific factors in these two areas are key for the

poorer, rural school district? Are there specific curriculums schools districts should use as a basis for professional development? What are the best vehicles to use for training? Which evaluation methods glean the most useful information while minimizing the amount of work required to conduct them? These are the questions the writer hopes to answer with this research.

# CHAPTER THREE
# THESIS DESCRIPTION

## Introduction and Overview

This paper began with a simple question, "What are the specific factors that poorer, rural school districts need to pay attention to in order to ensure the success of educational technology implementations?" As the literature review showed, there is an enormous amount of literature available on successfully implementing educational technology in schools. However, very little of it dealt with the poorer, rural school specifically. This work sought to address that need by creating a list of guidelines specifically tailored to the poorer, rural school district that would help ensure the success of educational technology implementations.

What follows are the results of this work. The remainder of this chapter contains an overview of work completed. Chapter Four contains a more detailed methodology used for the work, along with information on the sample population and how the raw data was collected and analyzed. Chapter Five compiles the information obtained during the data collection and literature review and presents a result. Chapter Six contains plans for dissemination as well as suggestions for future work. The appendices contain a copy of the letters and questionnaire mailed to various school districts, a breakdown of the school districts surveyed, and a copy of the guidelines created for poorer, rural school districts to use.

## Components and Activities

The goal of this work has been to create a set of guidelines that the poorer, rural school can follow in order to help ensure the success of educational technology implementations. The literature review uncovered a wealth of materials related to the successful implementation of education technologies, but the overwhelming majority of the literature originated from work done in larger and/or more affluent school districts. The author then set out to survey all of the poorer, rural school districts in Southwest Michigan in an effort to uncover those factors of specific importance to poorer, rural schools. The terms Southwest Michigan, rural, and poor were then defined, leading to the establishment of selection criteria.

The questionnaire was developed using the major classifications of guidelines uncovered during the literature review. The questionnaire also asked the selected school districts to describe their most successful and least successful educational technology implementations, and provide the factors they felt directly contributed to the success or lack thereof. The questionnaires were sent to a total of 14 school districts, of which 10 responded yielding a 71% return rate. The collection of data took much longer than initially expected, as it took the initial mailing plus two reminder mailings to elicit the ten responses. In the end, the survey process took six weeks.

The questionnaires were then analyzed with specific focus being paid to the factors underlying the successes and failures described, and the repeated themes and ideas being noted. This information was aligned with the framework established during the literature review, and the final results were compiled into the set of guidelines this work set out to create.

# CHAPTER FOUR
# STRATEGIES AND METHODOLOGIES

## Survey Sample and Procedure

Description of Sample

The sample population for this work was defined by three specific criteria. First, this work was to focus on school districts within Southwest Michigan. This definition was broad enough to allow for the collection of data from enough school districts to provide validity to the results, but also narrow enough to keep the amount of date collection and timeline required to complete the work appropriate for this project. As such, Southwest Michigan was defined to include the areas comprised by Allegan, Berrian, Cass, and VanBuren counties.

The second selection criteria was the classification of rural. This was a particularly difficult criteria to define. While the term rural is used often in the context of public education, the author was unable to locate any piece of literature which set out a specific definition or criteria for the classification of rural. The author then proceeded to contact several different state offices, including the Michigan Department of Education. Again, no criteria or definition were forthcoming. Using his own school district as a rough guideline, the author finally defined a rural school district as any district with a student enrollment of 2000 or less and a primary service area population of 10,000 persons or less. These student

enrollment and primary service area population statistics for all the public schools in the before mentioned four counties were obtained from the Michigan Department of Education School District Database for 1989-1990. This database is available at the State of Michigan web site via the URL http://www.state.mi.us/dmb/mic/source/educ/sddb.htm. Schools from the four counties not meeting this two-part selection criteria were removed from the study.

The remaining criteria, poor, was defined using the district gross total revenue per pupil. Based upon data obtained from Michigan Department of Education Bulletin 1011, Financial Data, 1996-97 [available at the Michigan Department of Education web site via the URL http://www.state.mi.us/mde/reports/B1011/], the average gross total revenue per pupil for Michigan public school districts was calculated to be $6201. Schools with a gross total revenue per pupil greater than or equal to the state average were also excluded from this study.

In the end, 14 schools met the selection criteria for this study, and all 14 were included in the survey process. A detailed list of schools and their relevant data is included in Appendix A of this thesis.

Description of Questionnaire

The questionnaire (see Appendix B) used to collect data from the selected school districts was designed to include several characteristics.

First, the questionnaire needed to have a logical framework. This framework was based on the framework of key components for effective educational technology developed during the literature review: planning, professional development, and ongoing evaluation. The questionnaire itself contained questions that directly pertained to professional development and evaluation. A third section of the questionnaire focused on the idea of effectiveness. Respondents were asked to provide their definition of effective in the context of educational technology implementations, as well as describe their most and least successful educational technology implementations, and those factors related to the success or lack thereof. The questionnaire also asked respondents to reflect on how they might have changed these educational technology implementations were they to do them again. The questionnaire also contained a short demographics section asking for current enrollment, student to computer ratio, age of existing computer hardware, and a basic staff usage profile.

Second, the questionnaire needed to be attractive and easy to read. This was accomplished by creating the questionnaire with a modern word processor using a combination of various font sizes and background shading to clearly identify the different sections of the questionnaire. It also needed to be designed so that it could be completed in 15 to 30

minutes, as such the questionnaire was limited to 14 questions on two pages. These characteristics were required to increase the potentiality of the questionnaire being completed by the selected school districts.

Finally, the questionnaire needed to elicit responses that were relevant to the work at hand. This was done by specifically asking for factors related to the success or failure of educational technology implementations, as well as asking for keys related to professional development and ongoing evaluation. The questionnaire engaged the respondent in a reflective analysis of previous successes and failures, with the hope that this reflection would reveal the factors for which this study was looking. On the questionnaire itself, the term "least successful" was used instead of the term "failure" in order to avoid the possibility of threatening the individual responding to the survey. A copy of the questionnaire is included in Appendix B of this thesis.

Description of Procedure

An initial contact letter, reproduced in Appendix C, describing the nature of the work and asking for a response was mailed along with a copy of the questionnaire and a self-addressed, stamped return envelope to each of the selected school districts. The letters were addressed to the technology coordinators of the districts. In the absence of a technology coordinator, the letters were addressed directly to the superintendents.

Two weeks after the initial contact, a follow-up letter, reproduced in Appendix D, was mailed to the participating school districts along with another copy of the survey and another self-addressed, stamped return envelope. Because the majority of the questionnaires received to date had been filled out anonymously, these follow-up letters were sent to all school districts not positively identified as responding to the first mailing of letters.

Two weeks after the second mailing, the follow up letters, along with a copies of the questionnaire and self-addressed, stamped return envelopes, were mailed a second time.

After three separate mailings and a time period of approximately six weeks, ten of 14 schools responded to the survey. Simple means were computed for all questions with numeric answers, and common responses and themes contained in the remaining questions were tabulated. Because of the small sample size, measures of spread were not computed, and the data itself was not disaggregated. A simple tabulation of the results can be found in Appendix E of this thesis.

# CHAPTER FIVE
# THESIS DATA ANALYSIS, RESULTS, AND CONCLUSIONS

## Data Analysis

As stated previously, ten questionnaires were returned. In general, the data proved more useful than expected. The only area lacking the desired level of input was the section dealing with professional development. As a whole, the details provided on the professional development actually taking place in the individual school districts were sketchy. Definitions to the term "effective" were more consistent than expected.

The most pertinent piece of information derived from the demographics section came when the student to computer ratio was compared to the percentage breakdown of staff usage types. With an average student to computer ratio of 14.3 to one and an average enrollment of 1,323, the author calculated an average of 94 "modern" computers per school district. This suggests that the schools selected for this study are in the early phases of their educational technology implementations.

Once the questionnaire data was compiled (see Appendix E), the results were compared to the information uncovered during the literature review. Several factors uncovered during the literature review were reinforced by the questionnaire data. The questionnaire data also yielded

factors not originally uncovered by the literature review. The results of this comparison lead to a compilation of those factors that the poorer, rural school district must pay additional attention to in order to ensure the effectiveness of an educational technology implementation, which was the intended goal of this work. In the following section, these factors are presented using the same organizational structure developed during the literature review. These results are presented again in Appendix F as a list of guidelines for schools to use during educational technology implementations.

## Results

### Technology Plans

While only two questionnaires specifically listed planning as important, the majority of the questionnaire responses listed individual components of planning as key. Several of the components given in the questionnaire echoed information uncovered during the literature review.

Because poorer, rural schools often lack the total revenue available to larger, more affluent schools, it is especially critical that money be spent wisely. One key to this is having a proper understanding of what a specific piece of educational technology can and cannot do. Farrell and Gring (1993) specifically encouraged schools to plan long term in an effort to avoid viewing educational technology as a quick fix or panacea. The

questionnaire data refined the concept of having the proper understanding of educational technology by encouraging schools to make sure they know exactly what the technology can do for the district, as well as by encouraging school districts to check out several solutions before making a final decision.

During the review of the results, it became clear that in order to spend available revenue as wisely as possible, school districts must understand their needs and ensure that the technology plan addresses them. This is in agreement with Vojtek and Vojtek's (1998) suggestion to assess where you are during your planning. It was suggested on one questionnaire that schools make sure that educational technology implementations are truly relevant to the classroom. It is also important that staff and community members believe in the validity of the educational technology needs of the district, and that they believe that the plan addresses those needs. Questionnaire data also suggested that a district's staff must "buy-in" to the technology plan. This suggestion is reinforced by Wagschal's comments on being mindful of teacher attitudes (1986).

Unfortunately, the questionnaire data did not suggest how to create this belief and "buy-in." However, it can be inferred from the questionnaires, and by the work of Vojtek and Vojtek (1998), that "buy-in"

begins with involving several players including administrators, teachers, support staff, parents, students, and community members on the planning committee. One questionnaire respondent recommended including outside consultants on the planning team, as their expertise can be of specific help to the smaller school that does not have technology specialists on staff.

Other issues related to educational technology planning mentioned on the questionnaires dealt with planning for adequate money and time. The smaller school does not always have the staff resources that the larger school may have, and as such must ensure that the time needed to implement the plan is available.

Poorer, rural schools are often more dependent on grant monies for the implementation of educational technology. Indeed, several questionnaire respondents mentioned this. This increases the importance of the poorer, rural school's technology plan being aligned to state and federal guidelines, as also suggested by Golden (1997). Meeting these guidelines is often the first stage of the grant review process.

A final suggestion made on one survey was focused on older school buildings, not necessarily poorer, rural districts. Be sure you plan for electric and other infrastructure upgrades as you plan your educational technology budget. In the author's own district, simply funding asbestos

abatements has become a significant expense, even a barrier at times, in upgrading the district's technology. This expands on Gust's (1998) comments uncovered during the literature review.

Professional Development

While only two references were specifically made to planning on the returned questionnaires, there were several more responses indicating not only the importance of training, but also on how to accomplish it. In fact, the importance of training was mentioned eight specific times. Where educational technology implementations had not been successful, insufficient training was often listed as a contributing factor. Two respondents also recommended that encouragement be provided along with professional development to ease fears and uncomfortable feelings as staff begin to integrate technology into their classrooms.

In terms of specific factors present in quality professional development in educational technology, the respondents to the questionnaires provided several including: having a staff "buy-in" to the need for training, providing for adequate time for training and practice, having a non-threatening learning environment, and seeking teacher input when planning the training.

The need for quality professional development, as well as accounting for the above factors, was strongly supported by the literature

review. But perhaps the strongest factor the literature review and questionnaire data commonly supported dealt with the content of training. Moersch (1995) warned against assuming that training staff on the operation of technology would lead to an automatic understanding of how to incorporate it into the classroom. Kearsley (1998) expanded this idea by suggesting that schools deliberately train on how to use the technology in the classroom specifically. These ideas are strongly echoed by the questionnaire data. Respondents suggested creating a vision for how technology will be used in the classroom, and then teaching those classroom uses specifically.

There were also several factors related to successful professional development in educational technology in the questionnaire responses that were not uncovered during the literature review. One respondent suggested using local staff, not hired trainers, to conduct training since the local staff would be more familiar with the specific training needs of the district. Other responses included proving snacks during the training, and also building interactive group work into the training.

The survey respondents also provided several examples on how to structure training. Suggestions ranged from after-school sessions to summer workshops. The implication of these suggestions seems obvious, the more varied the training times and formats, the better. Appendix E

contains descriptions of the six examples provided in the questionnaire data.

Ongoing Evaluation

It is this area where the author found the biggest discrepancy between the information uncovered during the literature review and the compilation of the questionnaire data. Among the ten school districts surveyed, the tally was split evenly among those schools that regularly evaluate their educational technology and those that do not. None of the five school districts reporting that they do not evaluate their educational technology on a regular basis indicated that such an evaluation was unimportant, but rather that such an evaluation was impractical due to reasons varying from the technology present in the district being too basic or too new to evaluate to the evaluation process being too informal or too time-consuming.

One respondent was honest enough to admit that the district simply did not know how to conduct such an evaluation. The author discovered this same trend during the literature review. Ongoing evaluation is considered important, but little information exists on how to conduct such an evaluation in a practical manor. The five schools indicating that they do conduct an evaluation of their educational technology on a regular basis reported a couple of different methods for

actually conducting the evaluation. Two districts poll their staff, students, and administrators, one by informal discussions, and another by a more formal written survey. Only one district reported formally measuring the amount and type of use of educational technology, however there was no indication given on how this was accomplished.

Other Concepts

The questionnaire data contained one more factor not directly uncovered during the literature review. In five specific references, the respondents to the questionnaires indicated teacher leadership as a key factor in the success of educational technology implementations. Data on why this was important, as well as on how to accomplish it was not provided. However, reasonable inferences can be made. As Cuban (1995) rightly states, the teacher has the final say over what occurs and what does not occur in the classroom. This includes the level and type of educational technology used. If such educational technology is to be effective, teachers must lead the effort in their individual classrooms.

## Conclusions

In the final analysis, there were few factors related to the effectiveness of educational technology implementations unique to poorer, rural schools. However, the research did reveal factors that take on extra significance in the poorer, rural setting. In general, these factors are a

specific result of a lower amount of capital and personnel available to the poorer, rural school district. The factors of particular importance to the poorer, rural school follow:

- *Incorporate relevant state and federal guidelines into your technology plan, especially if you are interested in grant monies.* Poorer school districts are often more dependent on grant monies to fund educational technology implementations, and as such must be sure their technology plan will not disqualify them during a grant review process.
- *Plan for the cost of infrastructure upgrades, including electric service, especially in older buildings.* Because of this added cost, poorer districts may not be able to implement technology on as grand a scale when these upgrades are needed. Poorer districts may also have a higher occurrence of outdated facilities.
- *Explore several different solutions to the problems revealed during your needs assessment, and do not be afraid to solicit the help of outside vendors.* Small, rural schools may lack the specialized technology staff often present in larger school districts. In this situation, outside vendors can bring expertise and solutions to the district that are not internally available.

- *Districts should plan for adequate time as well as money as they take on projects.* Again, smaller, rural schools often lack the personnel resources present in larger schools. As such, educational technology implementations may require more time to complete.
- *Districts should keep the evaluation of educational technology simple.* Again, with fewer personnel resources, small, rural schools may have less time with which to work.

Although the research contained in this thesis demonstrated that there are not a significant number of factors related to the effectiveness of educational technology implementations specific to poorer, rural schools, it did highlight those factors taking on a higher level of significance for the poorer, rural school, and as such is of value. There is little doubt that effective implementations of educational technology are important to the poorer, rural school, and the guidelines produced by this work can help ensure the effectiveness of whatever implementations a school district tackles.

# CHAPTER SIX
# RECOMMENDATIONS FOR FUTURE WORK AND PLANS FOR DISSEMINATION

## Recommendations for Future Work

Many of factors related to the effectiveness of educational technology implementations drawn from the questionnaire data echoed the factors uncovered during the literature review. As such, a larger study of this type is probably not warranted. Indeed, this work demonstrated the ease of identifying these factors. What was not always clear, both in the literature review and in the questionnaire data, was what to do in order to guarantee the presence of these factors. This was especially true in the area of ongoing evaluation. All sources of information agreed to the importance of such an evaluation, but few revealed how to practically accomplish it. In fact, half of the surveyed schools indicated that they do not currently evaluate the effectiveness of their educational technology implementations. Perhaps a next step would be to develop a set of rubrics, as well as a methodology, for conducting such an evaluation that is cost and time effective for the poorer, rural school, if not all schools in general.

## Plans for Dissemination

As previously stated, this work has been compiled into a set of guidelines for poorer, rural schools to use as they implement educational

technology into their districts. These guidelines, included in Appendix F, will be distributed to those questionnaire respondents requesting a copy of the final results. It is the intent of the author to post these guidelines on the Internet, and to make copies of the full thesis available to those who request it, again via the Internet. This information will also be shared with the District Technology Committee in the school district where the author is employed, and the author is also considering submitting a MACUL presentation proposal for their main conference Spring of 2000. This thesis will also be submitted to UMI for publication.

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## Appendix A – Selected School Districts

| School Name | County | Gross Total Revenue per Pupil* | Total Enrolment** | Population of Primary Service Area** |
|---|---|---|---|---|
| Bloomingdale Public Schools | VanBuren | 5508 | 1289 | 6165 |
| Brandywine Public Schools | Berrian | 5568 | 1653 | 8470 |
| Cassopolis Public Schools | Cass | 6024 | 1704 | 8123 |
| Decatur Public Schools | VanBuren | 5442 | 1228 | 5404 |
| Edwardsburg Public Schools | Cass | 5285 | 1842 | 9646 |
| Fennville Public Schools | Allegan | 5843 | 1525 | 7129 |
| Galien Township Schools | Berrian | 6039 | 642 | 2840 |
| Gobles Public Schools | VanBuren | 5441 | 1220 | 5339 |
| Hopkins Public Schools | Allegan | 5358 | 1757 | 5745 |
| Lawrence Public Schools | VanBuren | 5587 | 757 | 3583 |
| Lawton Community Schools | VanBuren | 5423 | 1120 | 5058 |
| Marcellus Community Schools | Cass | 5398 | 942 | 4649 |
| Martin Public Schools | Allegan | 5648 | 977 | 4418 |
| Watervliet Public Schools | Berrian | 5541 | 1214 | 6465 |

*Data taken from the Michigan Department of Education Bulletin 1011, Financial Data, 1996-1997. Available on-line at the URL http://www.state.mi.us/mde/reports/B1011/.

**Data taken from the State of Michigan School District Database, 1989-1990. Available on-line at the URL http://www.state.mi.us/dmb/mic/source/educ/sddb.htm.

**Appendix B – Questionnaire Mailed to Selected School Districts**

# Technology Implementation Survey

## *Section One: Demographics*

What is your current approximate K-12 enrollment? _____

What is your current student to computer ratio? _____

What percentage of your computer hardware is 3 yrs. old or less? ___

Approximately what percentage of your teaching staff fit into each of the following technology usage groups? (your total need not be 100%)

____ no use at all

____ use for class management purposes

____ use for classroom demonstration/presentation purposes

____ use in contexts where students have direct contact with the technology

## *Section Two: Effectiveness*

How would you define "effective" in the context of educational technology implementations?

Describe your district's most successful educational technology implementation.

What do you think were the key factors in its success?

Could it have been improved? How?

## *Section Two: Effectiveness (cont.)*

Describe your district's least successful educational technology implementation.

What was lacking?

What would you have done differently if you could re-do this implementation?

## *Section Three: Professional Development*

Describe your district's current professional development plans for educational technology including the number of planned hours and basic content.

What do you believe are the keys to effective professional development in educational technology?

## *Section Four: Evaluation*

Do you regularly evaluate the effectiveness of the technology in place in your district? If yes, how? If no, why not?

## Appendix C – Initial Contact Letter

Dear :

Please allow me to introduce myself. My name is Dan Vomastek, and I am the technology coordinator for Bangor Public Schools, as well as a Master's candidate in Grand Valley State University's educational technology program. As a part of my Master's thesis, am conducting surveys in several Southwest Michigan school districts in an effort to identify the key factors in effective educational technology implementations. I am focusing my work on smaller schools, and could benefit greatly from your answers to the questions contained in the attached survey.

The survey itself should take no longer than fifteen minutes to a half hour to complete. As an educator, I realize that time is often in short supply. I would greatly appreciate your willingness to set aside the time needed to complete the survey. I have included a self-addressed, stamped envelope to return the survey in for your convenience.

I thank you in advance for taking the time to complete this survey. If you would like, I would be happy to send you a copy of the final results of my work. Simply include a note along with your survey indicating where you would like the final results either e-mailed (preferred) or mailed via the regular postal system. Again, thank you for your time and effort towards this work.

Sincerely,

Daniel J. Vomastek
District Technology Coordinator
Bangor Public Schools

## Appendix D – Second and Third Contact Letter

Dear :

I am writing to you today to foliow-up on the letter and survey I sent you approximately two weeks ago. As I stated in that letter, I am working on a project towards the completion of my Master's degree in education. If you have not yet taken the time to fill out the survey, I offer you a humble reminder to do so, if you would. I know time is hard to find, but I feel this project is an important one – beyond the simple goal of fulfilling my graduation requirements.

Please consider completing the survey and returning it in the included self-addressed, stamped envelope. If it would be more appropriate for another person in your district to fill out the survey, feel free to route it to them. Again, I estimate that the survey will take no more than 15 to 30 minutes of your time. I have included another survey and envelope for your convenience. Again, thank you very much for your time and input.

For those of you who have already filled out and returned the survey, I offer you many thanks! The time and information you have provided is greatly appreciated.

Sincerely,

Daniel J. Vomastek
District Technology Coordinator
Bangor Public Schools

## Appendix E – Summary of Survey Results

Section One: Demographics

"What is your current approximate K-12 enrollment?" - $\bar{x}=1{,}323$

"What is your current student to computer ratio?" - $\bar{x}=14.3:1$

"What percent of your computer hardware is 3 yrs. old or less?" - $\bar{x}=53\%$

"Approximately what percentage of your teaching staff fit into each of the following technology usage groups? (your total need not be 100%)

"no use at all" - $\bar{x}=18.5\%$

"use for class management purposes" - $\bar{x}=18\%$

"use for class demonstration/presentation purposes" - $\bar{x}=16.3\%$

"use in contexts where students have direct contact with the technology" - $\bar{x}=38.5\%$

Section Two: Effectiveness

(numbers in parenthesis indicate total number of responses if other than one)

"How would you define "effective" in the context of educational technology implementations?"

Most popular themes included: technology is used to enhance student learning throughout district (5), technology integrated into curriculum(4), technology is achieving the outcomes it was designed for(2).

"Describe your district's most successful educational technology implementation?"

Answers vary. Actual responses not included as the only intent of the question was to engage the respondent in a reflective thinking process. See Chapter Four.

"What do you think were the key factors in its success?"

- Leadership on the part of teachers (3)
- Staff and community belief in need for educational technology (2)
- Grant monies (2)
- Training and encouragement (2)
- Extensive planning (2)
- Belief that the technology plan met the district needs

- Availability of computers
- Updated equipment

"Could it have been improved? How?"

- More equipment (4)
- More staff
- Exposure to different types of solutions for a given problem
- Greater investment in time and more follow-through
- More training

"Describe your district's least successful educational technology implementation."

Answers vary. Actual responses not included as the only intent of the question was to engage the respondent in a reflective thinking process. See Chapter Four.

"What was lacking?"

- Training and support (3)
- Better understanding of needs
- Better understanding of what the technology could do
- Classroom relevance
- Teacher leadership
- Adequate time
- Money

"What would you do differently if you could re-do this implementation?"

- Provide for more training (2)
- Use the software provided with the text books
- Involve staff who are willing to lead
- Plan for more time
- Seek the help of outside consultants
- Check the adequacy of the electric infrastructure first

Section Three: Professional Development

"Describe your district's current professional development plans for educational technology including the number of planned hours and basic content." (broken down by district)

- 20 hours for each teacher – 4 on basic computer use, 8 on Windows NT, 8 on Internet use. Next year will focus on Microsoft Office products.

- Two 2 hr. sessions each on Microsoft Works, Encarta, Internet use, PowerPoint. Staff paid for time spent in training, but not all staff attended.
- Voluntary training sessions with paid stipends.
- Six 2 hr. classes through year.
- 30 hr. summary academy for staff plus after school training 5 weeks per semester, 2 days per week, 3 hours per day.
- 1-2 days of professional development for introduction to new equipment and software.
- No current plan. (4)

"What do you believe are the keys to effective professional development in educational technology?"

- Staff buy-in (3)
- Adequate time (2)
- Good, local instruction (2)
- Create a vision for technology
- Have a non-threatening learning environment
- Provide time to practice skills
- Show classroom specific uses
- Money
- Require the training
- Seek teacher input
- Provide snacks
- Interactive group work
- Assess the staff's current level of proficiency before you start

"Do you regularly evaluate the effectiveness of the technology in place in your district?"

Yes (5) "How?"

- By technology committee via a comparison to original technology plan
- By discussing the technology with staff and administrators who are directly involved
- By measuring how much the technology is used and by who
- Staff and student surveys once per year

No (5) "Why not?"

- Not enough time or money to do so
- Tends to be too informal
- Technology is too new to evaluate
- Technology is too basic to evaluate
- Don't know how to

**Appendix F – Guidelines Prepared for Schools**

# Guidelines for Ensuring Effective Educational Technology Implementations

Daniel J. Vomastek
District Technology Coordinator
Bangor Public Schools

These guidelines are the product of a five month long thesis prepared in partial fulfillment of my Master's degree in education at Grand Valley State University. This project focused on those factors taking on extra significance to the poorer, rural school, and should be of assistance to you as you implement educational technology into your school.

While the guidelines given below apply to all schools, those factors specifically important to poorer, rural schools are given in italics. These guidelines are broken down into four separate sections: technology plans, professional development, ongoing evaluation, and other concepts.

For a copy of the thesis that produced these guidelines, please contact Daniel J. Vomastek c/o Bangor Public Schools at (616) 427-6800.

## Technology Plans

- Treat technology as an integrated part of the educational process, not as an isolated piece.
- Plan so that all students have equitable access to technology.
- View technology as an ongoing process, not a panacea to your educational woes.
- Include representatives from all groups involved in the educational process on the technology planning committee.
- Make an assessment of your current educational technology progress a part of your planning process.
- *Incorporate relevant state and federal guidelines into your technology plan, especially if you are interested in grant monies.*
- Plan for ongoing maintenance and repairs of existing equipment and equipment you plan to purchase.
- *Plan for the cost of infrastructure upgrades, including electric service, especially in older buildings.*
- Be wary of the use of technology "jargon." Define the terms you use in your technology plans.

- Monitor teacher attitudes towards and "buy in" to the technology plan.
- *Explore several different solutions to the problems revealed during your needs assessment, and don't be afraid to solicit the help of outside vendors.*
- Take the time to investigate what the technology you plan to purchase can actually do for your school district. Demo new technologies whenever possible.
- *Be sure to plan for adequate time as well as money as you take on projects.*

## Professional Development

- Don't assume that training staff on the actual operation of educational technology will translate into an understanding of how to apply that technology in the classroom.
- Provide training at a variety of times and places. Make the learning environment non-threatening and encouraging.
- If possible, provide comp days or stipends for training if it is not conducted during regular professional development days.
- Involve your staff in the planning of professional development.
- Provide interactive group work and hands-on assignments.
- Provide time for teachers to practice the skills they are learning.
- Have district staff provide the training whenever possible – they know your district needs the best.

## Ongoing Evaluation

- Evaluate the effectiveness of your educational technology implementations on a regular basis.
- *Keep the evaluation simple.*
- Talk to the people actually using the technology.
- Avoid using standardized test scores as a measure of success.

## Other Concepts

- Take whatever steps you can to develop staff ownership of and leadership in technology implementations.
- Supply as much in-house technology support as possible.

**GRAND VALLEY STATE UNIVERSITY**
**ED 695 DATA FORM**

**NAME:** Daniel J. Vomastek

**MAJOR:** (Choose only 1)

| | | |
|---|---|---|
| X Ed Tech | ____Ed Leadership | ____Sec/Adult |
| ___Elem Ed | ____G/T Ed | ____Early Child |
| ___Elem LD | ____Sec LD | ____SpEd PP |
| | ____Read/Land Arts | |

**TITLE:** A Descriptive Analysis of the Factors Related to the Effectiveness of Educational Technology Implementations in Poorer, Rural School Districts.

**PAPER TYPE:** (Choose only 1) **SEM/YR COMPLETED:** Summer 1999
____Project
X Thesis

**SUPERVISOR'S SIGNATURE OF APPROVAL** [redacted]

Using the ERIC thesaurus, choose as many descriptors (5 – 7 minimum) to describe the content of your paper.

1. Technology
2. Computers
3. Educational Technology
4. Program Implementations
5. Educational Planning
6. Professional Development
7. Educational Improvement
8. Guidelines
9. Rural Education
10. Economically Disadvantaged

**ABSTRACT:** Two to three sentences that describe the contents of your paper.

Because of their limited resources, poorer, rural schools must take extra precautions to ensure that the time and money they invest in educational technology yields effective results. This thesis identifies those factors which these schools must pay extra attention to in order to ensure the effectiveness of their educational technology implementations.