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The Acts of Leadership in Technology Implementation in Rural and Economically Disadvantaged School Districts: Selected District Personnel Perceptions

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The Acts of Leadership in Technology Implementation in Rural and Economically Disadvantaged School Districts: Selected District Personnel Perceptions

by

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DEDICATION

To my family, who taught me that life will have enough trials to make me strong, enough sorrow to make me human, and enough hope to make me happy.

To my daughter, Jordan, who stood beside me throughout this entire pursuit and taught me that someone can reach for my hand and touch my heart.

To my friends, who taught me that when it is too painful to look back and too fearful to look ahead that I can look beside me and they will be there.

To the profession of education that taught me to the world I may be one person, but to certain children I may be the world.

To someone special in my life who taught me that the best classroom in the world does not deliver its lessons on the top of a mountain, but along the side where the climbing occurs.

I also wish to dedicate this to Bill Whitworth, the late superintendent of Matagorda ISD. Bill Whitworth's inspiring mind began this project with me in the fall of 2001 and his spirit has guided me to completion. Finally, I would like to dedicate this work to my late friend and role model, Dr. Richard Kirkpatrick. He was a graduate of CSP Cycle 1 and truly one of the most innovative and progressive educators in Texas. His simplistic philosophy in education was to "always be a teacher first in all of your endeavors."

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The Acts of Leadership in Technology Implementation in Rural and Economically Disadvantaged School Districts: Selected District Personnel Perceptions

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The implementation of technology in education provides an additional route for facilitating student learning. Educators are charged with performing acts of leadership that provide guidance and opportunities for learning to occur. These leadership acts are unique to the situation and circumstances of each school district. To utilize technology to facilitate student learning, it is imperative to understand the leadership acts required of superintendents and teachers in this process.

The purpose of the study was to identify the acts of leadership in planning and implementing technology in rural and economically disadvantaged school districts, as perceived by educators in Ramirez Common School District and Matagorda Independent School District. The study featured a qualitative methodology utilizing the Interactive Qualitative Analysis (IQA) process to collect and analyze data from two focus groups of teachers, two mass interviews from the teacher focus groups, and two individual interviews from the superintendents for comparison and validation purposes. Data from the focus groups were used to establish the interview protocol. The interviews were transcribed and coded to elaborate on the emerging affinities from the focus group activity.

The findings of the study revealed that each teacher focus group discovered five acts of leadership in implementing technology in rural and economically disadvantaged schools. Three identified acts of leadership were recognized as commonalities in each of the focus group activities, leaving a composite list of seven identified leadership acts in implementing technology in rural and economically disadvantaged schools. Results showed that long-term and ongoing professional development, onsite technical support, and curriculum integration were three commonalities between both school districts in the proper and effective implementation of technology to facilitate student learning. The study also revealed the perceptions of how these leadership acts effect each other in the implementation of technology.

Based on the findings and conclusions, a list of recommended leadership acts was proposed for superintendents and teachers who may be charged with the duty of planning and implementing technology in rural and economically disadvantaged school districts.

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CHAPTER 1: THE PROBLEM AND ITS SETTING

Introduction

> There is a need for school leaders and educators who can respond quickly to a myriad of issues ranging from dealing with social change, diverse student populations, and demands for equity to improving school quality for every child and making effective use of new technologies. (Commission on Standards for the Superintendency, 1993, p. 3)

Educators are charged with various acts of leadership in the facilitation of educational opportunities. Given the current emphasis on technology implementation as a top priority in American public schools (Milken Exchange on Educational Technology, 1998), superintendents of all school district classifications, ranging from rural to urban, are encountering the challenges of aligning an educational vision and an effective plan to merge technology into their respective organizations. Key decision makers and leaders within a school community play a significant part in facilitating the implementation of technology in their districts. The Education Commission of the States (1995) has recommended that educational leaders and the local board jointly review, plan, and implement all major district projects related to technology and education. Thus, technology in education adds another component to the competencies and skills of educators in practicing leadership.

Background

Although the computer has emerged as the “defining technology” of the present time, electronic innovations and technologies originating in the United States date back to the 1940s (Makrakis, 1988). Moreover, electronic computers have existed since the 1930s and have been widely used in government and industry since the 1950s (Cheever et al., 1986). However, public schools were excluded from the use of technology during the computer revolution because much of the earliest software was designed for data applications, engineering, business, and military operations rather than for educational purposes (Picciano, 1994). Only a few high schools in 1978 were using computers for instructional purposes (Cheever et al.) and, according to the review of national surveys, as late as 1980 the student-to-computer ratio was 800:1, thus proving that technology was not a significant part of the educational experience (Picciano, 1994).

Since the early 1980s, the technology trend has intensified in the realm of education. By 1986 research had noted that there were over 1 million computers in elementary and secondary schools across the United States (Arch, 1986). Throughout the late 1980s and early 1990s the United States witnessed an implausible increase in the placement of technology within the classrooms in our schools. Data provided in a 1996 Quality Education Data report identified 1.8 million computers in classrooms during the 1989–1990 school year and 5.55

million computers in 1995–1996. As the growth of computers in classrooms continued, state and federal mandates soon focused on the growth of technology planning and implementation, specifying measurable outcomes tied directly to technology funding. The use of policy mandates in coordination with funding of technology programs is viewed as a crucial mechanism to ensure compliance, which in turn calls for a new leadership capacity among district administrators (Bemelmans-Videc, Rist, & Vedung, 1998).

Federal and State Efforts

The U.S. Department of Education Office of Educational Technology (2000) stated that the Clinton-Gore administration invested more than $8 billion in educational technology in America from 1995 to 2000. Federal efforts outlined by the Clinton administration included the goal of computer access for every student in every school by the end of the century. These efforts were instrumental in advancing planning processes at all levels in public education in the mid-1990s (President's Committee of Advisors on Science and Technology, 1997; U.S. Department of Education, 1996). However, the initial surge of federal technology mandates occurred in 1994 as part of the Goals 2000: Education America Act (1993). This act required that school improvement plans in states and districts receiving federal funding include a technology component to infuse "technology and technology planning into all educational programs and training functions carried out within school systems at the state and local level" (Goals 2000, 1993). The act also established a framework for the development of a national long-range technology plan by 1996 that would meet specific content stipulations for states and districts applying for grants under the Technology Literacy Challenge Fund. In addition to a national long-range technology plan, the first Universal Service Fund (E-Rate) surfaced as an extension to aide in fulfilling requirements for stand-alone technology plans. The E-Rate program was embraced by all states as they sought to obtain federal funds for school connectivity and accessibility.

In the fall of 1999, the U.S. Department of Education reinforced the priority of planning for technology implementation in public schools by initiating a process to review and revise the 1996 national educational technology plan. The outcome of this review was the development of a national educational technology plan consisting of new national goals for technology:

1. All teachers will use technology effectively to achieve high academic standards;
2. All students will have technology and information literacy skills;
3. Research and evaluation will improve the next generation of technology applications for teaching and learning; and

4. Digital content and networked applications will transform teaching and learning (U.S. Department of Education, 1996).

In conjunction with federal legislation, state-level mandates in Texas were instrumental in promoting educational technology planning as early as the 1980s (Texas Education Agency [TEA], 1996, pp. 3–5). The production of a statewide technology plan encouraged local school districts to build initiatives related to federal efforts. As the amount of federal and state funding allocated to school districts increased, the desired results for school reform in terms of improved student achievement and high-technology achieving districts began to require extensive planning and accountability measures reflecting the public's expectations of technology implementation. According to a survey by the Milken Exchange on Educational Technology commissioned by *Education Week* (Zehr, 1998), all 50 states had produced a statewide plan primarily in response to these federal provisions, including 25 states requiring their local school districts to also develop and maintain technology plans.

Planning and Implementation

By the late 1990s district technology planning and implementation had become a separate entity in itself as schools strived to meet specific state and federal mandates that required technology plans in order to receive funding

(Hoffman, 2001). As a result, a market for technology planning books, software templates, and independent technology planning consultants emerged to assist educators in technology planning efforts (Hoffman). Consequently, the planning guides promoted for schools proposed universal solutions to the problem of developing prescribed technology plans. In spite of the wide range of differences between school systems, generalized planning guides overlooked the specific acts of leadership that were unique to sorted school types.

In utilizing technology planning guides, educators soon realized the importance of developing leadership strategies reflecting technology competency, facilitation, management, planning, and implementation. For example, an emerging domain specifying the leadership functions of the superintendent started to gain considerable attention from all educational stakeholders. These newly required competencies and skills were communicated by various organizations. The American Association of School Administrator's *Professional Standards for the Superintendency* (1993) and the Council of Chief State School Officer's *Standards for School Leaders* (1996) make it clear that superintendents must add advanced instructional skills of technology leadership to their qualifications in order to lead effective technology implementation in their school districts (Maurer & Davidson, 1998, p. 23). As a result of developed competencies and proficiencies, all educators now have the opportunity to reference a theoretical basis of expertise in meeting the technology needs of school districts. One of the predominant themes coming out of the technology revolution is the emphasis on the acts of leadership required by educators in implementing innovative technology programs.

Rural and Economically Disadvantaged Schools

Planning innovative technology programs for students preparing for life in the 21st century has been the recent focus of rural school districts (Stern, 1994). Rural and economically disadvantaged districts are faced with a unique set of challenges that directly correlate with the demand for educators' leadership acts in technology planning and implementation. Stephens and Perry (1991) identified isolation, scarcity of population, and fiscal implications as challenges that complicated the ability of rural schools to obtain proper resources necessary to implement technology. Moreover, poor facilities in economically disadvantaged districts and teacher turnover contribute to additional challenges facing rural districts planning for new technology curricula (Anderson, 1996). The cost of acquiring computers, educational software, and other innovative technology resources also places a serious drain on rural and economically disadvantaged school districts (Barker & Hall, 1998).

In recognition of these challenges, rural educators during the late 1980s and early 1990s searched for additional funding in their budgets to offer their districts a chance to provide equal access to innovative curricula offerings, through distance learning and Internet access (Bayer, 1995; Howley & Howley, 1995). However, it became clear during this period that rural school districts typically lacked the physical infrastructure and resources to provide their students the 21st century miracles that technology had to offer (Howley & Howley, p. 127). These obstacles added to the challenges of defining leadership acts for educators implementing and planning technology to meet needs specific to these school districts.

Statement of the Problem

Extensive research has been done in the area of leadership acts and responsibilities in school-wide technology implementation (Picciano, 1994). However, limited research is available identifying leadership acts in technology implementation under conditions specific to rural and economically disadvantaged school districts (Hawk, 2001). This research study identified the perceived acts of leadership in technology implementation from a range of practitioners in two rural and economically disadvantaged Texas school districts. In addition, to the multiple guidelines that have outlined successful leadership acts of educators in implementing technology (Brody, 1995; Lumley & Bailey, 1997; Picciano, 1998), there are also specific leadership acts that are unique to rural and economically disadvantaged school districts. In fact, many guidebooks and implementation methods tend to overlook the challenges and needs specific to districts featuring these characteristics.

Technology implementation in rural and economically disadvantaged school districts requires unique leadership acts and duties of practicing educators in those school districts. For the most part, research in the field of technology implementation has tended to generalize planning practices across a varied spectrum of school district types (Farrell & Gring, 1993). This research study collected data regarding the perceptions of selected district personnel in rural school districts that contain a high number of economically disadvantaged students. In addition, this data identified acts of leadership in implementing technology based upon perceptions derived from actual practitioners working under these specific conditions.

Purpose of the Study

The purpose of this study was to identify the acts of leadership in implementing technology in rural and economically disadvantaged school districts, as perceived by educators in Ramirez Common School District and

Matagorda Independent School District. The study also identified the perceptions of how these leadership acts affect each other. Investigation of these two questions leads to further understanding of the leadership acts required to overcome challenges unique to rural and economically disadvantaged school districts, while providing a prioritized list of leadership acts answering these challenges.

Research Questions

1. What are the acts of leadership in implementing technology in rural and economically disadvantaged school districts?
2. What are the perceptions of how these acts of leadership relate to each other?

Methodology

This study was a qualitative approach that utilized the technique of Interactive Qualitative Analysis (IQA) developed by Northcutt and Miles at The University of Texas at Austin (Northcutt, Miles, Robins, & Ellis, 1998). A qualitative approach was utilized for its ability to fully capture, in depth and detail, the experiences of the participants (Patton, 2002). The IQA process identified elements and relationships through the participants' experiences. A focus group per school district consisted of teachers that allowed inquiry into areas of recurring themes, interconnected themes, and unanticipated issues that emerged through open-ended questions. According to Patton (1990), a qualitative strategy emphasizes interconnected themes, which was deemed appropriate for this study because the focus was to identify common themes about leadership acts in technology implementation in rural and economically disadvantaged school districts and perceptions of how these leadership acts affect each other.

This research effort was a study of two rural and economically disadvantaged Texas school districts implementing technology and overcoming the challenges that are unique to these district types. This study used multiple case study guidelines. The sample district population was based upon the following:

1. District identified as a Rural Community Type Texas school, according to 2000–2001 School District Profiles (Snapshot 2001 TEA Report),
2. District rating of Recognized or higher using the 2000–2001 Academic Excellence Indicator System (AEIS Report),
3. Attendance rate of 94% or higher on the 2000–2001 AEIS Report (actually reporting the 1999–2000 attendance rate),
4. District-wide economically disadvantaged student population of 85% or higher 2000–2001 (state average 49.19%),
5. Total annual state technology allotment less than $2,500 for 2000–2001,

6. Student enrollment of less than 100 per district, and
7. District demonstrated a level of technology infusion and effort in implementation by taking advantage and utilizing the Technology in Education (TIE) Grant, Telecommunications Infrastructure Fund (TIF) Grant, and the E-Rate Universal Service Fund.

The research respondents within the selected school districts consisted of practicing teachers and superintendents. Each respondent was provided the option of anonymity. In addition, the researcher was able to identify affinities through the transcribed interviews of the data groups, thus, identifying commonalities between the reported leadership acts. The data from the interview transcripts were coded and evaluated to validate, to repudiate, or to extend the affinities identified in the focus group sessions.

Definition of Terms

Acts of leadership: The conditions essential to implement technology in these specific district types.

Attendance rate: The total number of days, summed for all students that were present during the course of the year, divided by the total number of days students were in membership that year (TEA, 2001a).

Common School District (CSD): School district governed by the commissioner's county court (TEA, 2001a).

Economically disadvantaged: Students reported for free or reduced-price meals under the National School Lunch and Child Nutrition Program or other public assistance (TEA, 2001a).

Educational technology: The systematic process of applying computer-centered multimedia hardware, peripherals, software, and communications for teaching and learning, including administrative software that teachers may use in classroom management (Hoffman, 2001).

Rural school: A school district in Texas with a growth rate of less than 20% and the number of students in membership between 300 and the state median, or with the number of students in membership less than 300 (TEA, 2001a).

Superintendent: An administrator in these districts that acts as the sole administrative leader, which encompasses the principalship as well.

Technology: Refers primarily to computer and computer-related technologies such as data communications, interactive video, and digital television (Picciano, 2002).

Technology implementation: Actions and results of a public program in terms of output and outcomes (deLeon, 1999; Lane, 1990).

Technology planning: A formal set of ongoing actions taken by school districts to guide the implementation, evaluation, and revision of a program for educational technology that may or may not result in a written technology plan (Hoffman, 2001).

Significance of the Study

This study focused on the acts of leadership in implementing technology as perceived by educators in two rural and economically disadvantaged Texas school districts. Currently, there is a strong need for research in the identification of leadership acts in implementing effective technology programs and practices (Lyon, 1999). Although research has indicated schools that have exceptional technology programs exhibit a high level of commitment in leadership (Boone, 1993), there is a shortage of educators capable of leading effective technology programs (Riggs, 1993). By illuminating and identifying the acts of leadership in implementing technology in rural and economically disadvantaged school districts, this study contributes to the growing literature in the emerging field of technology implementation in schools.

The information gathered in this study has the potential to provide educators a better understanding of the leadership acts associated with the effective implementation of technology in rural and economically disadvantaged school districts. The results of this study will help rural school educators with their efforts to effectively implement educational technology in their schools. This information can identify the basis for further study, help planning of staff development activities, and enhance the opportunities for practicing educators to implement technology within their schools. Furthermore, this study provides a guide to better serve all students, teachers, and staff in Ramirez CSD and Matagorda ISD in effectively implementing technology.

Assumptions

For the purposes of this study the following assumptions were expressed:

1. The respondents were willing to answer the interview questions honestly and accurately.
2. The interview protocol accurately measured the perceptions of the respondents.

Delimitations

The following delimitations outlined the scope of this research study:

1. Implementation and planning of technology in the districts that were studied relied exclusively on qualitative interview responses rather than quantitative data, which included measurable goals, student achievement outcomes, and other results-based data that showed accountability in meeting a high level of technology implementation.

2. The study was limited to two Texas school districts with unique characteristics and challenges, which may not be applicable to other districts in the state.

Limitations

The findings of this research can be expected to apply specifically to Ramirez CSD and Matagorda ISD. Although other rural and economically disadvantaged districts may find commonalities with the study, the findings in this study are specific and may not be transferable to other contexts or situations. The findings were totally dependent upon participants' responses to semi-structured interviews and document collection. The respondents included practicing superintendents and teachers. The generalizability of this study is only applicable to the leadership acts of educators in implementing technology in Ramirez CSD and Matagorda ISD as perceived by these respondents and may not generate statements of universal applicability regarding other districts.

Organization of the Study

This study consists of five chapters. Chapter 1 provides the introduction and overview of the problem. Chapter 2 includes a literature review related to technology implementation in rural and economically disadvantaged school districts. In addition, the literature review includes the acts of leadership required in providing for educational technology in these school districts. Chapter 3 covers the theoretical framework for the study, which includes the methodology, procedures, instrumentation, and data analysis. Chapter 4 is a presentation of the data gathered and an analysis of these results. Chapter 5 contains conclusions made as a result of this study and provides recommendations for further research.

CHAPTER 2: REVIEW OF THE LITERATURE

Introduction

This chapter begins with a historical background of educational trends in technology. The presentation of the historical overview is divided into two subsections categorized by the following decades: 1980s and 1990s. This section briefly presents an overview of past technology trends that have circulated throughout education and have led to the emphasis on implementing technology through federal and state mandates. For organizational purposes the following sections will align the literature review with the chronology of the research questions that pertain to this study.

The focus of the second section of this chapter is the research on the development of technology plans. The purpose of this section is to identify important components of a district-wide technology plan needed to ensure the planning and implementation of technology into schools. This section builds a foundation for understanding the planning process and the research behind each specific component, while providing a segue into the leadership acts required in the implementation process.

The third section of the literature review identifies the leadership acts specific to educators in implementing technology programs in rural and economically disadvantaged school districts. Although there has been limited research in this field of specificity, a descriptive impetus for the responsibility of educators in technology implementation combined with studies of rural technology implementation serves as the framework for this section. The specific acts of leadership serving in a rural and economically disadvantaged school district are organized into four categories:

1. Understanding rural and economic trends,
2. Allocating resources and funding,
3. Providing accessibility and compatible infrastructure, and
4. Integrating long-term staff training programs with limited support.

An in-depth look at these four acts of technology implementation for educators in rural and economically disadvantaged school districts supplements the acts of leadership identified by the teachers and the superintendents in this study. A description of these four responsibilities provides a basis of knowledge in examining the findings and provides support in answering the research questions relevant to this study. The questions surrounding the leadership acts of educators in technology implementation in rural and economically disadvantaged schools provide a unique presentation of information for practitioners in these districts.

Educational Technology Trends

Brief Introduction of Trends

Since the 1950s, educators have realized the value of technology-based education. However, many schools and educators alike neglected to implement technology into the curriculum. Consequently, technology was an ineffective instructional resource, having virtually no impact on student achievement in the 1950s (Papert, 1993). During the mid-1960s, computer-assisted instruction emerged in an attempt to improve student achievement, in particular that of remedial learners (Cuban, 1996). Computer-assisted instruction was developed as an interactive technology to teach and to assess students in mastering concepts, while providing alternate branches of instruction for remediation (U.S. Congress Office of Technology Assessment, 1982).

To expand opportunities to increase student outcomes, many efforts were made in the 1970s to introduce various educational technologies into schools, such as instructional television VCRs (Cuban, 1996). Many of these concepts led to technological innovations that included more diverse and powerful technologies in schools (Honey, Culp, & Carrigg, 1999). These technologies included personal computers, learning systems, multimedia capacities, videodiscs, and advanced telecommunications through distance learning, which increased the potential for student impact in education during the 1980s and 1990s.

Educational Trends in the 1980s

Over the past two decades, modern technologies have transformed the skills and knowledge children will need to become successful adults and the relevant educational experiences they should encounter while attending school (U.S. Department of Education Office of Educational Research and Improvement, 2000). Throughout the 1980s, the evolution in educational technology included more than an increasing sophistication of hardware—schools were less interested in technology as an end in itself and more interested in technology as a means to an end. The North Central Regional Educational Laboratory (NCERL) documented a three-phase history of technology trends throughout the 1980s and 1990s. These phases were classified as follows: personal computers and learning systems throughout the 1980s, multimedia software in the early 1990s, and advanced telecommunications through distance learning extending into the late 1990s (Valdez, McNabb, Foertsch, Anderson, Hawkes, & Raack, 1999).

According to the NCERL report, the initial trend in the 1980s was the expansion of personal computers. The cycle of personal computers during the 1980s included such popular developments as the Texas Instruments 80 and the first Apple IIs (Noble, 1996). In addition to these innovations, the rapid growth of personal computers began to carry over into instructional purposes in education. National surveys in 1982 calculated a total of 250,000 personal computers in schools utilized for instructional purposes (Anderson & Ronnkvist, 1999). In 1985 the expansion of personal computers in schools increased to 1 million, and by 1989 the count had tripled to 4.2 million. Although there was a significant increase in personal computer installation and a desire to integrate related technologies into the realm of instruction, 4.2 million computers had relatively little impact on the totality of teaching and learning for 45 million students (Anderson & Ronnkvist).

During the late 1980s there was also a focus on computer literacy and the development of learning systems (Papert, 1980). Although learning systems were designed with the intent of transforming teaching and learning, learning lab settings hosting these learning systems were conducted mainly by paraprofessionals, which further isolated teachers from educational technology (David, 1994). In addition, innovations such as the microcomputer, videodisc, and artificial intelligence were supposed to supplement these newly developed learning systems, but instead were used strictly to increase standardized test scores and to facilitate existing record-keeping and financial systems (David). As a result, the trends of the 1980s increased the efficiency of current practices instead of transforming teaching and learning, thus not fulfilling the promise of improving instructional effectiveness and transforming schools utilizing educational technology (American Association of School Administrators [AASA], 1983).

Educational Trends in the 1990s

According to the NCERL, increased productivity through the use of multimedia software was part of the second educational technology trend beginning in the early 1990s (Valdez et al., 1999). These revolutionary developments focused on using any combination of two or more communications media, such as sound, images, video, and animation, to deliver instruction (Plotnick, 1996). The purpose behind the multimedia approach was to overcome the challenges of making lessons more interesting by addressing students with the introduction of simultaneous audio and video capabilities for interactive computer-based lessons (Picciano, 2002). As the development of multimedia continued, the variety of technology applications expanded to include teacher presentations, discovery learning, and student projects.

With the growth of student and teacher applications, educational technology initiated the exploration of choice and availability by providing information service anytime, anywhere in the world. Moreover, with the continual increase in personal computers and the phenomenal growth of the Internet in the early 1990s, obstacles of high production costs and a dearth of technical expertise began to vanish, leading to the proliferation of innovative telecommunication technologies such as distance learning (Ravaglia & Sommer, 2000).

The development of distance learning was the third trend in educational technology identified by NCERL. Advancements in telecommunications technology during the 1990s augmented distance learning. Some researchers have observed that no other single trend encompasses the theory and practice of educational technology better than distance education (Brennan, 1992). Moore (1990) defined distance education as consisting of "all arrangements for providing instruction through print or electronic communications media to persons engaged in planned learning in a place or time different from that of the instructor or instructors" (p. xv). In the early 1990s it was estimated that 25–50% of the nation's students were reached by distance education technology (Technology: "Wade Right In," 1991). By the fall of 1997 the National Center for Education Statistics reported 65% of schools were using some form of distant learning (Picciano, 2002).

The escalation of distance learning throughout the 1990s led to additional advanced telecommunication systems simultaneously evolving around the concepts of networking and interactivity (Ely, 1992). These concepts stemmed from individuals who used computers to communicate their common interests. The instructional arrangement of distance learning and the concepts of networking and interactivity paved the road for electronic connections that included virtual classrooms, videoconferencing, and e-mail systems. These electronic systems allowed for telecommunications such as distance learning to link educational resources from around the world (Ely).

In reviewing the educational trends in the past two decades, it becomes obvious that one resulting outcome is the emphasis on planning and implementing educational technology. The escalation in the development of these technologies during the 1980s and 1990s caused school districts to request additional funding from federal and state governments to meet the ever-changing needs of educational technology and the possible benefits for their children.

Planning and Implementing Educational Technology

The Development of Federal and State Efforts

Since Sputnik was launched in 1957, there has been national concern over the academic fitness of America's youth in regards to math, science, and educational technology. This event led to a constant focus on reform efforts in educational technology in the decades that followed. However, the most alarming emphasis and unrest came during the 1980s with the National Commission on Excellence in Education's 1983 report, *A Nation At Risk*. This report focused on the mediocrity of American public education and the acquisition of content and skills. As a result, education reform efforts of the 1980s focused on improving student achievement, content retention, accountability, testing, and literacy (Stewart, 1990). In addition, *A Nation at Risk* propelled educational technology to the forefront through many recommendations such as requiring each student to complete one-half year of computer science as a credit for high school graduation (National Commission on Excellence in Education).

Soon after, a revolution in communications and information technology made the computer a basic tool for acquiring knowledge, solving problems, and organizing systems (Neill, 1984). In the midst of the technology revolution, many generated reports have stated that despite technology and its innovations, the way America teaches is largely unchanged from a century ago (Information Infrastructure Task Force, 1994). The U.S. Congress Office of Technology Assessment (1995) reported results of a National Education Association study conducted in 1991. This report revealed that 68% of teachers stated that personal computers were readily available in their schools, but only 42% used this resource for instruction; and that 51% of teachers reported availability of tool software, but only 25% were using these materials regularly. National reports such as this one resulted in national education policies presenting mandates to state and local education agencies to plan and implement technology into their schools, supplementing mundane installation of hardware and software for effective instructional practices.

Federal Mandates and Efforts

The U.S. Education Department has become a significant partner in the planning and implementation of technology within school districts. Federal legislation initiated the foundation for states and local school districts to plan and implement educational technology into their schools. The baseline legislation activating technology planning and implementation in public schools was the Goals 2000: Education America Act passed in 1994. The Goals 2000 act was a comprehensive legislation piece that included two provisions designed to stimulate the use of technology in schools: the creation of funds for research and projects designed to enhance technology usage in the teaching and learning process, and the creation of the federal Office of Technology (Goals 2000, 1993).

This act required that schools receiving federal funding incorporate technology into their improvement plans to support the promise of restructuring schools and increasing student achievement (Goals 2000, 1993). Furthermore, this act established the first framework for a national technology plan that would meet criteria for states and districts applying for federal grants. Two noteworthy federal grants that have provided support for technology initiatives in conjunction with national policy are the Technology Literacy Challenge Fund and the Technology Innovation Challenge Grants. These federal grants have increased considerably over the past several years; some estimates indicate that they exceed over $540 million in total revenue since 1999 (Robelen, 1999).

Immediately following Goals 2000 and the establishment of federal grant monies was Public Law 104-104, commonly known as the Telecommunications Act of 1996. This act provided discounts in the cost of telecommunication services and equipment to all public and private schools and libraries (Puma, Chaplin, & Pape, 2000). These discounts were made possible through the establishment of the first Universal Service fund for schools and libraries. This fund, known as E-Rate, made districts eligible for services ranging from basic local phone services to installation of networking equipment. Even though E-Rate was designed around the concepts of accessibility and Internet connectivity, vital technology components such as computer hardware, software, professional development, and electrical upgrades were not covered and discounts were determined by economic need and rural location (Puma et al.). For this reason, rural and economically disadvantaged institutions utilize E-Rate as their primary means of gaining access to new technologies.

Goals 2000: Education America Act of 1994, the national technology education plan and revision in 1999, the Telecommunications Act of 1996, and the funds provided under these individual acts put the U.S. in the forefront of the technological revolution, while ensuring that schools follow through with planning and implementation by attaching mandates in accordance with receiving federal funds. Individual states soon adopted this strategy, including mandates when providing funds to local districts. These state mandates made certain that local districts were in compliance with state-level requirements.

State Mandates and Efforts in Texas

The policies of the federal government encouraged states to deploy statewide technology planning and implement state-level policies to ensure funding and program development (Knapp & Glenn, 1996). Texas has been a national technology leader since the early 1980s (TEA, 2001b). In the area exclusive to technology planning, Texas has led the nation with many mandates between the years 1983–2000.

Listed below is a timeline of state-level accomplishments in the area specific to technology planning. These highlights are followed by a brief description of the legislation and its intent. This background information will set the stage for understanding the historical phases of technology planning and implementation involving Texas school districts. The accomplishments are listed according to the Progress Report on the Long-Range Plan for Technology (TEA, 2001a):

1. September 1983 – HB 1304 called for the first statewide long-range technology plan. This legislation came at least a decade prior to federal policy regarding national or statewide long-range planning.
2. September 1988 – SB 650 authorized statewide initiatives defined by the 1988–2000 Long-Range Plan for Technology. This bill appropriated $6 million to begin implementation of the plan. It is recognized as the first legislation in the nation to appropriate funds exclusively for technology in schools.
3. September 1991 – The state required local districts to submit 5-year technology plans to TEA.
4. September 1992 – SB 7 included technology planning in campus and district improvement plans.
5. September 1993 – 22 planning grants were awarded to 77 school districts.
6. September 1995 – 16 planning grants and 5 implementation grants were awarded to 92 school districts.
7. September 1996 –The Long-Range Plan for Technology was updated and adopted by State Board of Education for 1996–2010.

8. September 1996 – The Technology Implementation in Education (TIE) grant program awarded $15.5 million impacting 195 school districts.
9. January 1998 – TEA directed the review of 812 district technology plans for the1st year of E-Rate funding.
10. June 2000 – TEA directed the review of 281 district technology plans for the 2nd year of E-Rate funding
11. August 2000 –The TEA Educational Technology Advisory Committee (ETAC) developed an online self-assessment tool (Texas STAR Chart) for districts to gauge progress in implementing the Long-Range Plan for Technology.
12. January 2001 – Educational Technology Coordinating Council released its State of Texas Master Plan for Educational Technology 2000–2003.

In view of these accomplishments, Texas has maintained consistent vision and continual progress toward the goal of statewide technology planning inclusive and aligned with all local school districts. In addition to technology planning, the funding for technology implementation is equally as important. Although Texas has many sources that fund technology implementation, there are three primary funding avenues for local districts: Annual Technology Allotment, TIF, and TIE Fund (TEA, 1996).

The Annual Technology Allotment was established in 1988 during the 71st Legislature with the passage of SB 1 (TEA, 2001a). “In creating the Technology Allotment, the legislature realized that the use of technology in education is not a one-time ‘vaccination’ approach to education. There is an ongoing cost in creating and maintaining a technology infrastructure” (TEA, 2001b, p. 1–7). Currently, the allotment is $30 per student, which allows the state to generate over $100 million dollars annually for local school districts (TEA, 2001a). This allotment allows school districts across the state a baseline fund to develop and expand their existing technology programs and training.

In 1995 Texas passed HB 2128, which established the TIF Grant (TEA, 2001a). The TIF Grant provided hardware, wiring, materials, and training for telecommunications installation development over the next 10 years (TEA, 1996). This grant included a $1.5 billion investment fund to support networking schools, libraries, and hospitals in Texas. In addition, this grant tied into the state’s technology planning initiative by requiring districts to have a technology plan in place in order to receive funds (TEA, 2001a).

The TIE Grant program began in September of 1996 by awarding $15.5 million dollars, which impacted 195 Texas school districts (TEA, 2001a). The purpose of the TIE Fund is to provide districts a funding source to capitalize on compatible infrastructure by integrating educational technology into the classrooms through a variety of innovations, which may include videoconferencing or distance education. Since 1996 the TIE Fund has increased the annual entitlement from $15.5 million to over $30 million and has reached over 400 entities a year (TEA, 2001a). Similar to the TIF Fund, applicants of the TIE Grant are also required to possess and maintain a district-wide technology plan.

It is evident that national policies have influenced the models Texas and many other states utilize in implementing and planning for educational technology. At the national level an emphasis on long-range planning combined with measures of compliance allow funding to circulate and to benefit educational technology through infrastructure, connectivity, program development, instructional delivery, student performance, and staff training. State-level policy in Texas reflects, on a smaller scale, the initiatives and intent of national mandates and reform efforts. Although Texas as a state has focused on technology planning and implementation, these initiatives have not yet caused the fundamental changes in Texas classrooms that were originally envisioned (TEA, 2001b).

Therefore, it is important take a closer look at the planning and implementation that transpires at the district level and the acts of leadership in facilitating this process by examining the basic framework of the technology plans at this level. In a review of various technology planning guides, the discovery of general commonalities can generate a consolidated checklist of focal points that are a necessity to the composition of a district-wide technology plan.

District-Wide Technology Plans

Planning Process

Although a majority of the literature reviewed listed a well-written technology plan as the most important key to effective implementation, research has suggested that school districts find technology planning a challenge. Educators have had difficulties planning for innovations they do not fully understand without any clear models of what should be involved in the planning process (Burns, 1996). Vojtek and Vojtek (1998) stated that all successful technology implementations begin with a technology plan. Technology plans should approach technology as part of the overall process of education, not as an isolated component (Ocasio, 1995). In addressing technology in schools, it is important for educators to remember that the power of technology lies in how it meets the needs of children (Farrell & Gring, 1993).

Existing literature related to technology plans does not include a prescriptive format about what a successful planning process looks like or what a final written plan should contain, although there are some commonalities among many researchers' recommendations. Some planning guides emphasize process, while others focus on content. Furthermore, many detailed proposals give little attention to the link between the plan and the implementation process. In an attempt to consolidate the reoccurring components found in widely distributed technology guides, the following section provides an analysis identifying the most commonly found steps in a variety of plans to enhance the understanding of district-wide technology plans.

Planning Components

1. Establishing a District Technology Planning Team

Technology planning committees should enlist the membership of participants that have the knowledge, power, and ability to move the plan forward and make things happen (Winter, 1998). According to Kimball and Sibley's (1998) rubric for helping districts meet the requirements for receiving federal Universal Service Plan (E-Rate) funds, obtaining broad-based support by including practitioners, community members, and experts is vital in equitably representing all stakeholders in a technology planning team. In addition, Lumley and Bailey's (1997) model lists establishing a district technology planning team as the first step districts should take before technology implementation occurs.

Other authors have supported this initial stage in technology planning. Bodolay (1997) developed a "how-to" planning guide for the South Central Regional Technology in Education Consortium that was based around the National Center for Technology Planning model. This guide included a phase that differs in terminology from other guides, but correlates in content: "organizing the players." In organizing the players, Sun (2000) has suggested that since the planning process contains multiple tasks, it is essential to gather members with a variety of skills. By including a wide range of contributors, stakeholder groups, and participants, planning committees become an integral part in creating a strategic technology plan that connects the educational mission with the technology within the school district.

2. Creating a Vision Statement

According to Sun (2000), "a well-defined vision statement is the cornerstone of any good plan" (p. 36). The vision statement should result in a single concise paragraph that reflects the district's core values as they relate to educational improvement and the role that technology will play in supporting those values. In the technology plans reviewed for the purpose of this study, the vision was sometimes the first step in the process, even preceding developing a technology planning committee. Establishing a vision for determining the direction of a technology plan allows participants to develop a plan that will serve the organization's mission—not drive it.

Most planning guides are aimed at changing the teaching and learning environment, which in turn causes the plans to develop around curriculum issues. According to Levine (1998), curriculum-centered plans tend to receive recognition more for the design and writing of the plan than for actual significant improvements. These plans become so focused on student learning that they overlook teacher-driven instruction. However, some technology proposals focus specifically on strategies for vision, goal setting, and needs assessment, concentrating on the change process and philosophical issues.

In search of supporting plans including vision statements, Lemke (2000) and Sun (2000) have identified essential components of technology planning in which a shared vision is a critical part of the framework for guiding technology planning. These guidebooks—and many more—incorporate the component of vision as the structure that develops an ideal picture of what the district can look like (Sun). Including the vision statement as an early step in the process of technology planning is pertinent to expanding the program throughout the organization.

3. Needs Assessment

After the technology vision statement is formed, the next planning step is to reveal the school district's present status in relation to district-wide educational technology (Vojtek & Vojtek, 1998). According to Lumley and Bailey's (1997) planning model, assessing the current state of technology within the district is an important focus in striving for a high-quality strategic plan. The needs assessment should be a comprehensive document that contains detailed information on hardware resources, technology needs, and surveys identifying training received and student and teacher usage (Roblyer & Edwards, 2000). This assessment should also focus on the school's strengths, weaknesses, opportunities, challenges, current needs, and perceived future needs (Five Great Technology Plans, 1995). According to Kimball and Sibley (1998), the importance of the needs assessment is to identify not only technology variables in implementation, but also environmental variables such as educational values, demographics, facilities, and community responses. Incorporation of these variables will allow districts to produce a true reflection of where they are and where they aim to be.

4. Setting Goals and Objectives

The next step in technology planning involves the process of setting goals and objectives. Goals are broad, comprehensive, and realistic in addressing teaching and learning needs. According to Winter (1998), goals 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. In addition, the design of these goals should allow for measurability over time (Farrell & Gring, 1993).

On the other hand, objectives are specific, realistic, and delineated from goals. Roblyer and Edwards (2000) have suggested that objectives outline specific activities to take the organization from the current status to the desired status. Stated objectives clearly define the steps that need to be taken in order to achieve district goals through planning, purchasing, and training.

5. Curriculum Implementation

The next step in technology planning is curriculum implementation. Integrating technology into the curriculum can be defined as students and teachers using technology to enhance teaching and learning and to support existing goals and objectives (Sun, 2000). Curriculum implementation starts with making sure that teachers and students have developed a basic understanding and knowledge of computer usage (Picciano, 2002). Once this basic understanding has been acquired, implementation involves developing a knowledge base of the many different ways computers can be used. This planning component involves those who possess instructional and technical expertise and who ultimately may be responsible for implementing new applications (Roblyer & Edwards, 2000).

The fulcrum for curriculum implementation lies within the teaching staff. Teachers are critical participants in software and instructional evaluation for staff development purposes. Administrators must provide leadership in these areas, assuring that training resources are available (Picciano, 2002). Therefore, curriculum implementation of technology is closely attached to staff development, which, along with a vision statement and needs assessment, is a vital ingredient of a technology-based plan.

6. An Evaluation Plan

Following the implementation of technology into the curriculum is the evaluation phase of technology planning. Evaluation can be defined as the means to examine the performance of the overall technology program as well as specific aspects of the program (Sun, 2000). Evaluation usually addresses the questions of accountability, impact, sustainability, and quality. Unfortunately, evaluation is usually the weakest component in technology plans due to a variety of factors that include the lack of school district professionals with expertise in evaluative procedures, the unrealistic expectations of policymakers and funding agencies, and the oversight of standardized exams in measuring student benefits from technology usage (Sun). Even though evaluation has been identified as lacking substance in some technology plans, it is nonetheless the measuring stick to ensure continual improvement in implementing educational technology and planning for staff development activities.

Designing an evaluation plan must involve stakeholders in the development of criteria (Picciano, 2002). Rubrics or questionnaires can be used to determine indicators of success, weaknesses, or prescribed benchmarks. In addition, Kearsley (1990) has suggested that evaluation procedures be designed to measure current ongoing progress as well as long-term results. To measure short- and long-term progress, the evaluation criteria must be aligned with the vision and appropriate to the goals (Picciano, 2002).

7. Professional Development

Professional development and training in technology can be defined as teaching, reviewing, and clarifying the knowledge and skills necessary for implementing technology tools into the teaching and learning environment (Boyd & Fitzgibbon, 1993). In addition, professional development should clearly describe existing and needed technology competencies in order to take teachers and staff to the level of technical skill required by the technology plan. According to Sun (2000), professional development must be substantial (approximately 30% of the technology budget), ongoing, and onsite. In order to make these qualifications happen district-wide, professional development must become a major part of the technology plan. This provides educators the opportunity to develop strategies for correcting a serious imbalance between computer acquisition and technical knowledge.

"One fundamental reason for this imbalance is that some of today's teachers, especially those trained before the early 1980s and before the proliferation of microcomputers, were not exposed to technology as part of their pre-service teacher training programs" (Picciano, 2002). As a result, many certified teachers lack technical skills. However, in the 1990s state agencies and universities began to alleviate the problem with built-in methods courses in educational technology that included basic operations, information technology, pedagogical issues, and ethics (Picciano, 2002). This movement, combined with the variety of staff development activities provided to school districts, has been effective in closing the gap between teacher knowledge and the extensive use of educational technology.

An analysis of technology planning guides and research identifying the support for each component must discuss the acts of leadership required of educators in technology implementation. Most previous research studies have outlined in a general format the leadership competencies in technology implementation, without recognizing the specific needs of sorted school types and socioeconomic status. For the purposes of this study, the next section identifies four specific acts of leadership in planning and implementing technology in rural and economically disadvantaged school districts. These leadership acts include:

1. Understanding rural and economic trends,
2. Allocating resources and funding,
3. Providing accessibility and infrastructure, and
4. Integrating long-term staff training programs.

These considerations are in addition to the general components identified earlier in a district-wide technology plan because they are specific to the needs of these district types. According to the literature, to facilitate technology implementation in rural and economically disadvantaged school districts, educators must understand these four acts of leadership.

Acts of Leadership

Impetus

It is true that education, through developing human capabilities, provides needs for people to seek and contribute to changing situations in societal development (Chandra, Kulkarni, & Ray, 1988). In relation to this statement, a prominent situational change in society is the ongoing technology revolution. Public schools are responding to the societal demands of technology by shaping schools into technology-rich, student-centered organizations, which increases the demands on educators and educational leaders to obtain new competencies in order to implement district-wide strategies for technological innovations in schools. As a result, new leadership is emerging in public schools, individuals who embrace the use of technology as a catalyst to support and to facilitate the process of teaching and learning.

In most cases, with respect to technological advancements, rural and economically disadvantaged schools are underserved when compared to their urban counterparts (Butler, 1991). Although many educational researchers and policymakers view technology as an emancipating resource for rural schools and citizens (Carlson, 1994; North Central Regional Educational Laboratory, 1995; Seal & Harmon, 1995), few rural school districts have the technological resources common in metropolitan areas. In addition, "rural research, particularly education research, is undertaken by comparatively few scholars" (Stern, 1994, p. 4), which creates yet another challenge for rural and economically disadvantaged school educators in search for ideas in district-wide technology implementation.

As early as 1991, the U.S. Department of Education Office of Educational Research and Improvement addressed this situation in a brochure, "An Agenda for Research and Development on Rural Education," which outlined the topics that representatives of the rural research community, educational associations, and federal agencies considered important, including technology innovation. Stemming from the awareness stimulated by this brochure was a more recent initiative, the Rural Systemic Initiatives, designed by the National Science Foundation "to address barriers to systemic and sustainable improvements in science, mathematics, and technology education in rural, economically disadvantaged regions of the nation" (Eisenhower National Clearinghouse for Mathematics and Science Education, 1995). As a result of these initiatives, other organizations have begun to recognize the need for technology research on rural schools populated with economically disadvantaged students (Barker & Taylor, 1993).

District-wide technology implementation in rural schools presents an immense challenge. Envisioning success for new technology-based modes of teaching requires rethinking the traditional organization of learning to include new responsibilities for administrators, teachers, and students (Dede, 1997). Educators in rural districts face decisions regarding allocations of limited resources as they consider plans to provide accessibility and training, to build competencies and skills in alternative types of pedagogy relating to the process of teaching and learning (Dede).

In rural school districts that serve areas of low population density and have small enrollments, a guided technology plan that involves thorough implementation and design will benefit students in meeting state standards of learning and college standards that require students to complete advanced courses in science, math, technology, and foreign language. According to Fullan and Stiegelbauer (1991), implementing a successful plan that requires change into any social system is difficult because it involves putting into practice an idea, program, or set of activities new to people attempting to or expected to change. The responsibility of rural educators in district-wide technology implementation is to facilitate technological change in the social system for the benefit of the children they serve, despite the perceived challenges that economically disadvantaged districts may present.

In order to perform this duty, it is important to understand underlying trends, issues, and characteristics unique to these district and community types. Furthermore, to overcome challenges throughout the process of technology implementation, educators must possess the background knowledge of the rural and economically disadvantaged districts they serve. The following section outlines four leadership acts common to these school types: understanding rural and economic trends, allocating resources and funding, providing accessibility and infrastructure, and integrating long-term staff training programs.

The Leadership Act of Understanding Rural and Economic Trends

Since the 1920s, rural America has seen a steady migration of its population to urban areas. During the time period 1979–1982, America witnessed one of the worst recessions in history. As a consequence, rural communities suffered a crisis in agriculture production that cost thousands of farmers their land. In addition, foreign competition stripped American industries of millions of jobs. In the following years, a sharp decline in energy prices caused areas depending on drilling and mining to endure economic hardships as well (Stern, 1994). School consolidation was the recommended solution for communities in economic despair (Theobald & Nachtigal, 1995). Between 1903 and 1992, the number of schools in the U.S. was reduced from 238,000 to 79,876— most of those that disappeared were small rural schools (DeYoung & Lawrence, 1995).

Rural schools were important to the development of rural communities in terms of economics and the quality of rural culture. In either case, educational technology occupied a place of importance in rural schools. The use of technology increased the effectiveness of traditional models of education used in rural school districts and helped overcome some of the inadequacies endemic to these settings by providing innovative alternatives for students to learn (Becker & Barker, 1994).

Problems in rural schools surfaced from the limitations and disadvantages that are part of rural environments. Rural schools tended to be poorer than other school districts, with a lower average per-capita income, higher levels of poverty, and often a narrower tax base (Becker & Barker, 1994). Other environmental factors contributing to limitations in these districts included the large geographical areas that rural districts encompassed, low levels of family income in many rural areas, and the lack of financial resources in these districts (Vaughn, Boethel, Hoover, Lawson, & Torres 1989). Although the effective usage of modern technology helped alleviate some of these problems and maximize rural education, there are remaining issues in educational technology resulting from such limitations.

Despite the rapid growth of computer technology and the Internet into the fabric of American schools, there are important differences in accessibility to 21st century technology. For many schools, especially those in high-poverty and geographically isolated communities, a lack of access to new technology is a serious problem, as are a lack of adequately trained technical and instructional staff, and other more basic problems such as inadequate electrical power and space. To further this point, students from high-income communities have far more access to computers and sophisticated uses of them than do students from low-income, disadvantaged communities (Tyack & Cuban, 1995).

In many states, including Texas, a certain percentage of schools have access to the best information technology available. Students at these schools have access to the most powerful computers and the fastest Internet service, as well as a wealth of content and opportunities related to their lives. However, there is another group of students. This group, for one reason or another, doesn't have access to the newest or best computers or the fastest, most convenient Internet connectivity. The difference between these two groups of students has been called the "digital divide," a trend facing many of the nation's school districts (U.S. Department of Commerce, 1995, p. 1).

The group on the less-fortunate side of the divide is found disproportionately in rural areas. According to the U.S. Department of Commerce survey (1995), the lowest level of computer ownership (4.5%) was found among rural households. Recognizing this problematic trend in rural underserved schools, educators must have an understanding of the digital divide in order to identify outlying characteristics that will impede the process of technology planning and implementation in their school districts.

As Texas continues to grow, the population is becoming more diverse ethnically and economically, which further adds to the disparities in student population. Over 46% of Texas students are economically disadvantaged (TEA, 2000). Compounding this statistic, Texas has great contrasts in wealth, among the greatest in the nation. For instance, in 1989 the nation's richest county, with a per-capita income of more than $34,000, and the nation's poorest county, with a per-capita income of $3,312, both were located in Texas (Vaughn et al., 1989, p. 6). Texas' diverse population includes over 3.3 million people living in rural communities, which at one time ranked 2nd in the nation (Beeson & Strange, 2000). In the context of education, these small and rural communities comprise a large percentage of all Texas school districts. Furthermore, these rural school districts contain a statewide student poverty average of 20.4% and a minority population of 31% (Beeson & Strange). These statistics are evidence that economic disparities of this magnitude reflect not only student population, but also the diversity of rural communities as a whole. In rural, economically disadvantaged school districts seeking equitable access to technological advancements, these characteristics can present an enormous obstacle for practicing educators.

Depending on the perspective and the audience, technology is referred to as either a "godsend" or a "nightmare" in rural education (Vaughn et al., 1989, p. 15). To the advocate, technology holds promise to disseminate information from all over the world to remote, rural school districts, allowing resources to be independent of geographic location. In contrast, some interest groups would argue that the costs, expertise, procurement of accessibility, and service can be overwhelming issues for small administrative units in rural, economically disadvantaged districts.

The Leadership Act of Resource Allocation and Funding

Rural schools with ever-tightening budgets have encountered the daunting challenges of keeping pace with the constant changes in the technological innovations of the 21st century. With the advent of technology innovations in education, educators in rural and economically disadvantaged districts are continually facing fiscal issues in implementing technology in the midst of the digital divide. In particular, inadequate resources and funding for education are acute problems in those widespread rural areas where poverty is a way of life. Even though educators, over time, have developed different approaches to solving finance dilemmas—initiating special bond issues, restructuring existing budgets, utilizing special state-level funds, and raising external funds—these approaches are broad-based methods often not conducive to a rural and economically disadvantaged school district (Hawkins, Spielvogel, & Panush, 1996).

Since rural areas have always depended on schools to be the central focus of community life (Stern, 1994), the leadership act of funding technology implementation in the school system has a direct influence and impact on the standard of technology throughout the community. However, financing technology in rural districts continues to be a problem. Educators in these districts can utilize specific strategies to enable funding and resource allocation for educational technology. The following strategies have been identified as necessary in technology implementation for educators in rural and economically disadvantaged school districts:

1. Strategic budgeting,
2. Strategic purchasing,
3. Evaluating technology life expectancy, and
4. Staying abreast of modern technology in similar rural school districts.

Strategic budgeting in technology planning and implementation relates to mapping out the total costs of technology from installation to implementation (Punderson, 2001). Educators should think of fiscal management and strategic budgeting as providing the means to accomplish their educational objectives and goals. Any educational and program goal—newer technology, staff development, or more curriculum—can be met using strategic budgeting if the total costs are considered (Spillane & Regnier, 1998, p. 101).

In budgeting for technology, educators need to consider the total costs for effective implementation. In other words, if a school spends most of its money on hardware, then training, maintenance, technology infrastructure, licensing, and software tend to be sacrificed in expenditures (Punderson, 2001). A key consideration when purchasing technology is factoring the phases of implementation into the total cost. If technology purchases are just viewed in terms of hardware acquisition, then the chances of teacher and student benefits occurring in the educational process are minimal at best. As a result, strategic purchasing is another necessary consideration for educators funding effective technological innovations in rural, economically disadvantaged districts.

In the past few years, all rural educators purchasing technology have shared the same experiences with technology implementation—rapid planning for modern technology innovations combined with rising costs of membership and more severe budget constraints. To expand further on financing and maintaining current technological innovations, educators are finding it increasingly difficult to maintain current technological systems and updated versions of software with outdated hardware. According to Technology in Education (2001, p. 130), 67% of total technology spending in education is directed toward hardware purchases, while software purchases are totaled at 20%. In economically disadvantaged districts bulk hardware purchases can easily consume an entire budget appropriation for technological expenditures. Therefore, these districts are spending incrementally on hardware purchases and, in turn, finding themselves in situations where much of their hardware is so antiquated that parts are no longer being manufactured.

To further complicate this situation, many rural schools are still using decade-old software, which isn't equipped with the capabilities to take advantage of the instructional benefits offered by multimedia systems and the capabilities of recent hardware packages (Wodarz, 1996). Consequently, dated software is primarily of the drill and practice genre, and instructional specialists agree that it's not the best method for educating students. Research has proven that recent hardware units capable of utilizing multimedia systems allow students a greater level of interaction and provide a more enriched learning environment (Picciano, 1998). Therefore, educators providing educational opportunities for all children with the best practices of instruction must strategically budget for and purchase current technological advancements in instructional delivery for effective technology implementation.

Another important strategy for educators in rural and economically disadvantaged schools is reviewing the life expectancy of technology. Educational leaders and school boards have become accustomed to capital expenditures, such as building renovations and transportation, as having a substantial lifespan (Wodarz, 1996). However, given the rate of technology innovation in regard to capital expenditures, equipment can become outdated in 18–24 months, presenting another challenging factor for educators in technology implementation (Wodarz). Furthermore, despite limitations of technology expectancy, educators in rural districts with weak economic bases should ensure that their schools and communities receive continual technology-based resources and networking (Chalker, 1999). With this in mind, purchases need to be categorized as ongoing consumable products instead of one-time capital expenditures, accounting for the life expectancy of technology. Therefore, evaluating the life expectancy of technology becomes another critical element in implementation related to strategic budgeting and purchasing of hardware and software applications within a school district (Cooper, Nisonoff, & Speakman, 2001).

Another strategy in funding technology in rural and underserved school districts is staying abreast of modern technology innovations in schools with similar characteristics (Damon, 2001). Financially, staying abreast of modern technology in rural districts suggests that educators focus on ideas based on current innovations utilized in similar districts, while becoming intimately involved with the development of budgetary items for long- and short-term technology expenditures. Educators generally have much to learn about the potential of technology and how to anticipate its various benefits in terms of performance and financial investments (Damon). By staying current with technological advancements in surrounding schools, rural educators can justify budgetary investments in technology and garner support for future purchasing initiatives (Cooper et al., 2001). As a result, educators can combine a comparative evaluation of technologies in similar districts with strategic budgeting and wise investments to maintain and facilitate successful systems for enhanced student learning.

The Leadership Act of Providing Accessibility and Infrastructure

Infrastructure can be defined as a structured system including all the networking, hardware, software, and system components required to support interconnected learning environments (Boethel, Dimock, & Hatch, 1998). Although substantial progress has been made installing computers in rural schools, social inequalities remain in the use of cutting-edge, high-level technology as a result of infrastructure capabilities (Technology in Education, 2001). For this reason rural, economically disadvantaged students are not well represented among the online technological population.

In addition, educators find it difficult to focus on integrating high levels of technology to facilitate district-wide learning when the district cannot overcome basic technological equipment and facilities issues. “Schools that serve students in economically disadvantaged areas typically have greater barriers than schools in affluent communities in getting the basics in place” (Sun, 2000, p. 13). As a result, there are an assorted number of infrastructure and accessibility problems in rural and economically disadvantaged districts that include lack of security, insufficient basic electricity, and the costs of connectivity (Goodridge, 2001). Educators must follow a plan to ensure up-to-date infrastructures. According to Sun, infrastructure is a very complex area of technology planning. Therefore, Sun developed a four-step plan recommended for educators involved with infrastructure issues in rural and economically deprived school districts:

1. Determine specifications for hardware and software acquisitions,
2. Provide an assessment plan of the district's infrastructure,
3. Develop budget summaries and funding strategies, and
4. Create a timeline.

In researching strategies in hardware and software specifications, Sun (2000) stated that software applications (instructional materials) should be determined by the district's instructional needs and should ultimately drive the hardware (equipment) that is purchased. Educators in rural, underserved districts should play a vital role in selecting such technologies. In addition, the considerations of compatibility and ease of use are important factors educators should peruse when selecting hardware and software.

The second step of the plan is for educators to provide an assessment of the district's current infrastructure status. Technology software and basic hardware become outdated in a short period of time. Performing an annual infrastructure assessment allows educators to monitor technology by understanding the capabilities of the school district in determining future technological innovations (Barker & Taylor, 1993).

The third part of the plan discusses important strategies for educators in rural and economically disadvantaged districts in regards to developing budget summaries and funding strategies. To fund a technology plan, educators must utilize alternatives such as grants, subsidies, and private funding to maximize local funds, while also searching for federal and state aid. Strategic budgeting is a vital component in a technology plan, allowing for careful and wise investments in purchasing district infrastructure (Punderson, 2001).

According to Sun (2000), the final step in the infrastructure plan is the act of developing a realistic timeline for district implementation. Planning a timeline will help educators map out the required time for various phases of infrastructure implementation. To create the timeline, educators should start with the end in mind and work backwards, while providing flexibility to readjust expectations (Sun). This four-step plan incorporates infrastructure strategies for educators in rural and economically disadvantaged school districts.

There is little question that rural educators face ever-increasing pressures in meeting the demands of their jobs. As if these challenges were not enough, educators must face the incredible hype and pitfalls—educational, technical, and professional—that technology presents to them everyday. It is no secret that failure to address technological needs could impede the opportunities for student learning in rural, economically disadvantaged communities (Spillane & Regnier, 1998). Accessibility and infrastructure provide the foundation to facilitate technology in the teaching and learning process. Therefore, it requires the leadership acts of these educators to emphasize and to focus on the need to provide appropriate infrastructure in rural and economically districts that often face the challenges of poor facilities, in order to create an organization capable of housing instructional technology innovations.

The Leadership Act of Integrating Long-Term Staff Training Programs

For rural and economically disadvantaged schools, a challenge facing educators is the responsibility of ensuring the implementation of long-term staff training programs. Rural schools, at best, build 1- or 2-year training programs, which conflicts with research stating that successful computer competency implementation among staff takes a minimum of 5 years of training (O'Donnell, 1996). Hampered by poor facilities and lack of funding, rural, underserved districts continue to struggle to implement and to sustain long-term training programs because of continuous costs and inaccessibility to innovative training opportunities delivered through technology (Kennedy & Barker, 1989). In order for students to become technologically competent, teachers in these districts must become knowledgeable about technology. As the National Commission on Teaching and America's Future (1996) stated, "What teachers know and can do makes the crucial difference in what children learn" (p. 5). Yet, despite its importance, training is often sacrificed in rural and economically disadvantaged districts trying to provide innovations, especially the long-term, ongoing training required for effective implementation.

In rural and economically disadvantaged districts, compared to other districts, teachers are more isolated from ongoing developments in education; teach a greater variety of courses, allowing for a lack of specialization and expertise; have outdated or inadequate supplies; and receive lower salaries to perform multiple tasks (Kennedy & Barker, 1989). Therefore, educators in these districts must possess a variety of skills and abilities in order to meet the divergent needs of students, parents, and community members (Crystal, 2001). Access to information and training opportunities in rural schools is often limited; therefore, all educators must take an active role in staff training (Boyd & Fitzgibbon, 1993).

In order to provide examples of the responsibilities of educators in rural and economically disadvantaged school districts, Southwest Educational Development Laboratory staff interviewed four school administrators experienced in planning for professional development and long-term training. The administrators interviewed described their experiences and provided this list to advise other rural and economically disadvantaged school districts trying to implement staff development programs. This list is applicable to providing long-term staff development and training in all program areas, including technology implementation.

1. Identify programs that will fit the special needs of the district.
2. Utilize resources available from state departments and intermediate service agencies.
3. Identify funding sources within the school budget.
4. Subscribe to the Federal Register.
5. Write and submit grant proposals.
6. Train staff in grant-writing techniques.
7. Choose proven programs to replicate.
8. Identify model schools for site visits.
9. Assist in the passage of bond issues.
10. Network with colleagues.
11. Work with local institutions of higher education.
12. Conduct workshops.
13. Utilize community resources.

These strategies provide techniques for educators in rural districts trying to surmount unique challenges to planning, implementing, and sustaining ongoing staff development training. Educators implementing technology in rural, economically disadvantaged districts carry the responsibility of ensuring that teachers can obtain expertise, competence, and practical tools in providing technology to the children they serve.

Summary

For educators implementing technology in rural districts, four major responsibilities must be carefully considered for effective technology implementation: understanding rural and economic trends, providing resources and funding, ensuring accessibility, and integrating long-term staff training.

The literature has identified specific leadership acts for educators planning and implementing technology in rural and economically disadvantaged school districts. In addition, these leadership acts are above and beyond the traditional planning components included in generalized technology guides. The perceptions of educators in rural and economically disadvantaged school districts regarding technology implementation was the focus of this study. The methodology of this study is outlined and described in the next chapter.

CHAPTER 3: METHODOLOGY

The purpose of this chapter is to explain the methodology and procedures used throughout the study. Next, this chapter describes the research plan and design of the study. The participants are identified and the sampling methods are described. Finally, the data collection and analysis is explained and detailed.

Statement of the Problem

Extensive research has been done in the area of leadership acts and responsibilities in school-wide technology implementation (Picciano, 1994). However, limited research is available identifying the leadership acts in technology implementation under conditions specific to rural and economically disadvantaged school districts (Hawk, 2001). This research identified the leadership acts required by educators in technology implementation as perceived by a range of practitioners in two rural and economically disadvantaged Texas school districts. While multiple guidelines have outlined the leadership acts of educators implementing technology (Brody, 1995; Lumley & Bailey, 1997; Picciano, 1998), these prescriptive methods have not proven to lead to effective technology implementation in rural and economically disadvantaged school districts. In fact, many guidebooks and implementation methods tend to overlook the leadership acts specific to districts featuring these characteristics.

Educators practicing technology implementation in rural and economically disadvantaged districts are required to exercise unique leadership acts and duties. For the most part, research in the field of technology implementation tends to generalize planning practices across a varied spectrum of school district types. Additional research is needed to support educators in rural and economically disadvantaged school districts facing the responsibilities of planning and implementing technology.

Purpose of the Study

The purpose of this study was to identify the acts of leadership in implementing technology in rural and economically disadvantaged school districts, as perceived by selected district personnel in Ramirez Common School District and Matagorda Independent School District. The study also identified the perceptions of how these leadership acts affect each other. Investigation of these issues led to an understanding of the leadership acts required by educators in technology implementation.

Research Questions

1. What are the acts of leadership in implementing technology in rural and economically disadvantaged school districts?
2. What are the perceptions of how these acts of leadership relate to each other?

Research Design

This study consisted of a qualitative methodology that attempted to describe the perceptions of the acts of leadership in implementing technology in rural and economically disadvantaged school districts. A qualitative approach was utilized for its ability to capture, in depth and detail, the range of experiences from the participants involved (Patton, 2002). Interactive Qualitative Analysis (IQA) was established as the analysis technique utilized to complete this study (Northcutt et al., 1998). An IQA was used to address issues and themes that developed throughout the course of study. The qualitative technique employed analyzed processes, systems, and two focus groups to ground the data. The IQA process was based on grounded theory, which allowed the researcher the opportunity to understand the experiences of the participants in the most rigorous and detailed manner possible (Denzin & Lincoln, 1994).

Martin and Turner (1986) described grounded theory as an inductive discovery methodology that allows the researcher to develop a theoretical account of the topic of study while simultaneously grounding the account in empirical observations and data. Grounded theory generates elements and relationships inductively through the absence of a preconceived research framework. In addition, grounded theory acts as a strategy that emerges from close interactions and direct involvement with the participants of the research study (Patton, 1990). This design provided rich contextual data that was analyzed to determine elements and affinities.

Interactive Qualitative Analysis

The IQA is a research technique designed and developed by Northcutt and Miles (Northcutt et al., 1998). IQA uses a focus group that produces, collects, and analyzes qualitative data. The results of these focus groups formulate the protocol for participant interviews. The interviewing process is then used to stimulate conversation and meaningful dialogue between the researcher and the participants identified in the focus groups. In addition, this allows the findings to emerge from the data and facilitates the provisional testing of relationships and concepts during continuous interactions (Myers, 1998). The IQA techniques allow the researcher to move the participants through a series of inductive and deductive qualitative analyses allowing elements and relationships to surface. This direct engagement of the researcher during the interviewing process allows the study participants to develop their own meanings and realities for coding and analysis.

Participants

This study was a multiple case study involving two Texas school districts. The researcher obtained approval to receive access and conduct research in these school districts. Access occurred through initial phone contacts to the superintendent describing the study at length. Next, the researcher electronically mailed the proposal abstract to the superintendent and other district leaders for review. After one week the researcher contacted the district for approval. Upon approval, the researcher made a trip to visit with the superintendent to discuss the proposal in more depth. Finally, the researcher sent a letter of agreement approving the research, for documentation purposes, to the superintendent to sign.

The participants for this study were selected by purposive sampling. According to Guba and Lincoln (1989), the concept of external validity is addressed through the process of sampling. The TEA maintains a database of information on individual school district profiles. These reports include community type, district accountability ratings, demographics, economic composition, student enrollment, and funding allotments. These reports were used to identify the sample population according to the following criteria:

1. District identification as a Rural Community Type Texas School, according to 2000-2001 School District Profiles (Snapshot 2001 TEA Report),
2. District rating of Recognized or higher 2000–2001 Academic Excellence Indicator System (AEIS Report),
3. Attendance rate of 94% or higher on the 2000–2001 AEIS Report (actually reporting the 1999–2000 attendance rating),
4. District-wide economically disadvantaged student population of 85% or higher 2000–2001 (state average 49.19%),
5. Total annual state technology allotment of less than $2,500 in 2000–2001.
6. Student enrollment of less than 100 per district.
7. A district demonstrating a level of technology infusion and effort in implementation by taking advantage and utilizing the TIE Grant, TIF Grant, and the E-Rate Universal Service Fund.

Purposive sampling was utilized from the criteria above to select two school districts for the study. The districts were small enough in population to enable all practicing teachers to participate in the focus groups and the interviewing process. The superintendent of each school district did not participate in the focus group, but did participate in a final interview.

Data Collection of Focus Group

The procedures for data collection included a series of prescribed activities that provided a significant amount of qualitative data. The first step in data collection was to take the focus group, excluding the superintendent, through a warm-up activity by facilitating a general discussion on technology implementation in rural and economically disadvantaged school districts. This raised ideas and thoughts relating to the purpose of the study. Moreover, this developed clearly identified affinities for the study. An affinity can be described as a set of textual relationships with a common or thematic meaning. The researcher took general notes on a flipchart during this facilitated topic of discussion.

Next, the researcher guided the focus group through a scenario based upon the implementation of technology in rural and economically disadvantaged schools, in particular the issues regarding leadership acts that are pertinent to this process. This exercise was designed to place the participants in a frame of mind that allowed them to reflect on the acts of leadership in technology planning and implementation in rural and economically disadvantaged school districts. The intent of this process was to place participants in a relaxing, comfortable state of mind free from distractions. This allowed participants to reflect on and to express their experiences regarding the acts of leadership in the process of technology implementation. The research questions previously cited served as the hub in the process of affinity development.

The researcher then guided the focus group through the group silent nominal process (Northcutt et al., 1998). This technique is a process that stimulates thought construction based on the scenario mentioned earlier using inductive coding. In this phase of IQA the scenario is concluded in the context of an open-ended question, allowing the participants to identify affinities after the actual scenario. The scenario in this research study was the following:

> I would like for you to describe your feelings and response to the scenario I will read to you describing an educator who is given the directive to implement educational technology in a school district. I will spend some time providing information on the rural and economically disadvantaged school district and I would like you to respond by listing and describing acts of leadership specific to the task of implementing technology in this school district.

In this process the participants were given 3 minutes to write down their thoughts using a separate index card for each thought (five words or less per card). The cards were constructed without the influence of other focus group membership. This process ensured that domineering staff members did not have the opportunity to provide distorted influence on the other members.

The next step in IQA is the clarification of the meaning process within the study. The purpose of this stage was to identify common themes and to define terms and phraseology. The researcher addressed all uncertainty in responses from the participants by reading each and every card in an effort to gain consensus. Participants of the study organized the index cards into grouped categories as they deemed appropriate. The participants were free to move, sort, and shift the cards until a consensus was reached on the affinity categorization (see Figure 1). Then participants were instructed to name each category as a reflection for discussion. This process transpired in two distinct ways:

1. Inductive coding (grouping into categories) – a method of analysis in which the focus group sorts the posted cards into categories on their own to identify affinities.
2. Axial coding (naming the categories) – a deductive method of analysis used to narrow, refine, reorganize, and describe the range of meaning of each affinity written in the context of others.

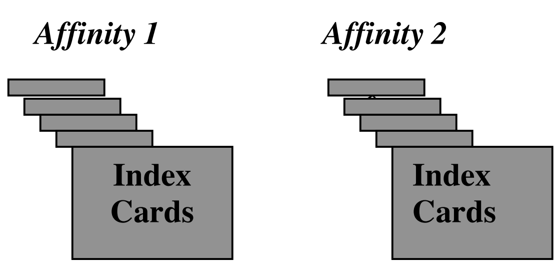

Figure 1. Affinity categorization.

The participants were encouraged to divide the affinities into hierarchical systems of subaffinities through dialogue. The descriptions were then narrowed to a definition of consensus reflecting the meaning of the affinity.

Data Analysis of Focus Group

The researcher utilized every affinity through the interview protocol outline. In addition, each affinity contained an introduction so the participants understood their concepts. An IQA interview consists of two kinds of questions:

1. What does this affinity mean to the respondent? (Axial code questions)
2. How does this affinity relate to all the others in a system of perceived cause and effect? (Theoretical code questions)

First, the axial code question was developed for each affinity. The purpose was to encourage subjects to name their feelings and to provide examples. Next, the theoretical code questions (cause and effect) were developed for each affinity in order to encourage participants to name their perspectives on this topic.

The IQA technique guided the exposure of information through the data collected. Data was organized into an interrelationship diagram (IRD). Next, the data was analyzed and eventually became part of the systems influence diagram (SID). Following the organization of the SID, the influence of each affinity was determined through the process of theoretical coding. Each affinity was given a number and paired with all other numbered affinities. The researcher chose one affinity and paired it with all others until all affinity pairings were exhausted.

The next step in the process was to determine if a relationship existed between each affinity and if the affinities influenced one another. For example, in pairing affinity 1 and affinity 2 there are three possibilities:

1. Affinity 1 can influence affinity 2 (1 _ 2).
2. Affinity 2 can influence affinity 1 (1 _ 2).
3. No relationship exists between affinity 1 and affinity 2 (1 <> 2).

The patterns of influence were determined initially by the focus group of each school district and then the affinities were grounded in the data. A tabular IRD was developed. See Figure 2 for an example. The direction of the arrow in the IRD was determined by the influence that one affinity had over another. For example, in Figure 2, affinity 2 influences affinity 1. The patterns of influence of the affinities identified cause-and-effect relationships. These varied in degree from primary drivers to secondary drivers, and secondary outcomes to primary outcomes. A review of the drivers and outcomes helped construct a SID representing the degree and placement of influence. See the SID example in Figure 3.

The direction of each affinity influence was determined through the input of the focus group per school district. Every relationship in the interviews was coded, first by code order and then by frequency order. If relationships were identified in both directions between the affinities, then the one with the most frequency was determined as the affinity with the most influence. After the IRD was constructed for each group, the SID was developed.

The IRD for each school district identified the aggregate influence of each affinity on the others. A primary outcome was determined if an affinity was influenced by many others and had very little influence on other affinities. If the opposite occurred, then the affinity was classified as a primary driver. If the influence between the affinities fell within the two extremes of primary drivers and outcomes, it was classified as a secondary driver or a secondary outcome.

Tabular IRD													
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**IN**	**OUT**	**Delta**
Affinity 1		□	↑	↑	↑						1	3	-2
Affinity 2	↑		↑	↑	↑						0	4	-4
Affinity 3	↑	□		↑	□						2	2	0
Affinity 4	□	□	□		↑						3	1	2
Affinity 5	□	↑	□	□							3	1	2
Affinity 6	↑	□	□	↑	↑						2	3	-1
Affinity 7													
Affinity 8													
Affinity 9													
Affinity 10													

Figure 2. Sample table interrelationship diagram (IRD).

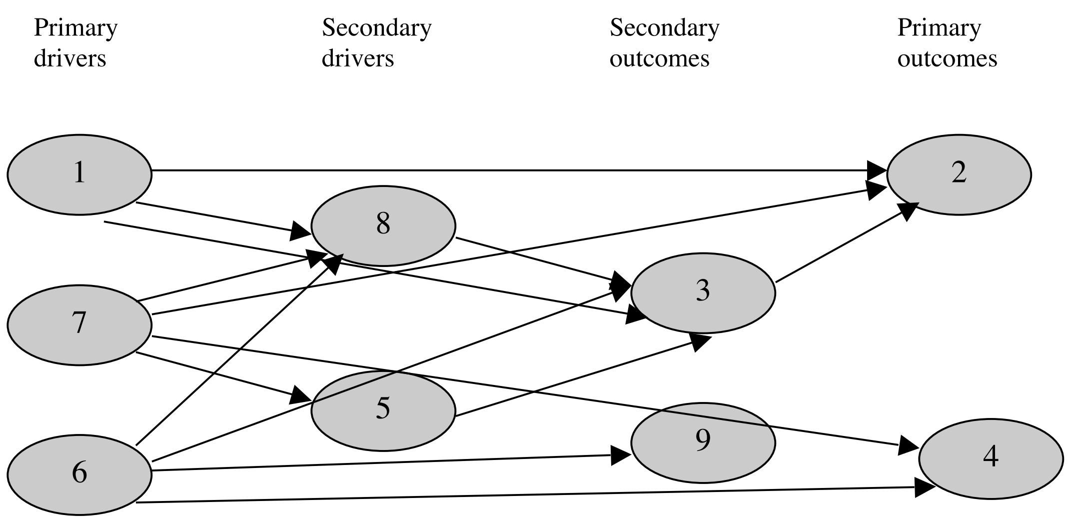

Figure 3. Sample systems influence diagram (SID).

Data Collection of the Interviews

The interview sample size was not predetermined, but was based on the assumption that both school districts were small enough in enrollment size to interview all teachers. Therefore, participants were accurately representative of their school districts. Members were determined after receiving permission from The University of Texas at Austin and the two superintendents to perform focus groups. Appropriate follow-up included personal phone contacts, e-mail messages, and letters describing the researcher and the study. Next, the superintendents were contacted via e-mail within ten days to ensure receipt of the letter and to discuss confirmation of interview schedules. Two days prior to the interview, the superintendents were contacted via phone as a friendly reminder and debriefing. Each appointment was scheduled for a minimum of an hour. Interviews were transcribed and coded for further analysis.

The purpose of the interview process was to provide comparability between the focus cluster findings, including the affinities or influences, and the information from the superintendent. The interview instrument was then developed based on the data gathered during the focus group exercises. The interviews centered around two questions:

1. What does this affinity mean to you?

2. How does this affinity actually relate to the leadership acts in planning and implementing school-wide technology?

Data Analysis of the Interviews

The two interviews with the focus groups and the two superintendents were analyzed and coded into different groups. The directional relationship of each affinity was established through theoretical coding processes in the IQA process. After theoretical coding, the total number of relationship frequencies was compiled in order to develop the tabular IRD. In the process a comparable “mind-map” was developed between the district leaders’ perspective and the staff’s perspective on the acts of leadership in implementing technology in rural and economically disadvantaged schools districts.

Summary

This chapter provided a brief overview of the research design and the data collection and analysis procedures. This IQA technique established tight procedures for conducting a careful methodology. The research method allowed for participants to use their own experiences to determine the relationships of the affinities. The research design of the study generated enough significant data to allow for a thorough analysis, which is reported in the next chapter.

CHAPTER 4: FINDINGS

The structure of this chapter was developed using the research questions as the framework in reporting the results of the study. This chapter addresses the findings of the study utilizing the two research questions that guided this study.

Research Questions

1. What are the acts of leadership in implementing technology in rural and economically disadvantaged school districts?
2. What are the perceptions of how these acts of leadership relate to each other?

District Population Sample

The sample population in this study consisted of teachers and superintendents from Ramirez CSD and Matagorda ISD. The two Texas school districts were identified as Rural Community Types according to the 2000–2001 Snapshot TEA Report. These two districts demonstrated excellence in student achievement. Each school district in the study possessed a district-wide accountability rating of Recognized or higher as listed on the 2000–2001 AEIS Report. In addition, the economically disadvantaged student population served in these districts exceeded the state average of 49.19%, which deemed them as poverty school districts. Furthermore, the district population selected demonstrated a level of technology infusion and effort. Each district utilized the TIE Grant, TIF Grant, and the E-Rate Universal Service Fund.

Data Groups

The data was organized, gathered and collected into four separate groups. The four focus groups in the study are Group I (Ramirez CSD teachers), Group II (Ramirez CSD superintendent), Group III (Matagorda ISD teachers) and Group IV (Matagorda ISD superintendent).

Group I

Group I consisted of 4 teachers representing the entire faculty of Ramirez CSD. The average tenure of teachers in Group I was 9 years. The maximum years in teaching experience at Ramirez CSD was 18 years and the minimum was 2 years. Group I teachers serve 34 students in a PK–6, multi-age instructional arrangement. Group I teachers demonstrated different levels of expertise in planning and implementing technology due to considerations that are unique to Ramirez CSD.

Group II

Group II consisted of the superintendent of Ramirez CSD. This superintendent has practiced in Ramirez CSD for 12 years. The superintendent has developed a sound working relationship with the community and the three-member school board of trustees. The superintendent has the responsibility of infusing technology into the educational system. As a result, the superintendent has taken on the duties of grant writing, strategic budgeting, aligning professional development activities, building capacity, developing an infrastructure, and all other tasks associated with the implementation of technology into Ramirez CSD.

Group III

Group III consisted of 8 teachers representing the entire faculty of Matagorda ISD. The average years of teaching experience in Group III was also 9 years. Group III teachers serve 79 students in a PK–6 instructional arrangement. Group III teachers demonstrated different levels of expertise in planning and implementing instructional technology in Matagorda ISD.

Group IV

Group IV consisted of the superintendent of Matagorda ISD. The superintendent has practiced in Matagorda ISD for 1 year. The superintendent was previously employed as an administrator in surrounding school districts. The superintendent has been designated the responsibility of sustaining and improving district-wide educational technology. Furthermore, the superintendent was charged with ensuring that the capacity and knowledge of staff members enabled the effective and efficient use of technology in facilitating student learning.

Research Question 1

What are the acts of leadership in implementing technology in rural and economically disadvantaged school districts? What are the affinities?

The affinities that comprise the acts of leadership in technology implementation in rural and economically disadvantaged school districts as described by teachers of Ramirez CSD (Group I) included: Pre-Planning for Accessibility, Long-Term Professional Development, Onsite Technical Support, Basic Skills in Equipment Care, and Curriculum Integration.

The superintendent of Ramirez CSD (Group II) concurred with the five affinities the teachers of Ramirez CSD (Group I) had described as the acts of leadership in technology implementation in rural and economically disadvantaged school districts.

The affinities that comprised the acts of leadership in technology implementation in rural and economically disadvantaged school districts as described by teachers of Matagorda ISD (Group III) included: Ongoing Professional Development in Educational Technology, Onsite Technical/Instructional Faculty Member, Neighborhood Network Connectivity, Strategic Allocation of Resources, and Curriculum-Driven Software Integration.

The superintendent of Matagorda ISD (Group IV) concurred with the five affinities the teachers of Matagorda ISD (Group III) had described as the acts of leadership in technology implementation in rural and economically disadvantaged school districts.

Affinities: Group I

Group I consisted of 4 teachers representing the entire faculty of Ramirez CSD. The average tenure of teachers in Group I was 9 years. The maximum years in teaching experience at Ramirez CSD was 18 years and the minimum was 2 years. Group I teachers serve 34 students in a PK–6 multi-age instructional arrangement. Group I teachers demonstrated different levels of expertise in planning and implementing technology due to considerations that are unique to Ramirez CSD.

1. Pre-Planning for Accessibility

Pre-Planning for Accessibility was reported and validated by the group interview conducted in Group I as a major leadership act (affinity) in implementing technology in rural and economically disadvantaged school districts. Throughout the group discussion, Group I described the vital importance of performing a district-wide needs assessment as a part of pre-planning for accessibility. In addition, Group I teachers stated it was essential that pre-planning for accessibility include facility and budget considerations. "Pre-planning is performing a needs assessment to see what is available and what is needed to reach the goal of providing a cost-effective technology plan" (Group I Interview Axial Code Table).

Group I teachers used the needs assessment to make informed instructional decisions in the initial stages of pre-planning for accessibility. Another integral use of pre-planning for accessibility, as indicated by Group I teachers, apprised the superintendent and board of trustees with valuable information to guide decision making related to budgetary and facility arrangement issues.

2. Long-Term Professional Development

The teachers of Group I identified Long-Term Professional Development as a major leadership act (affinity) in implementing technology in rural and economically disadvantaged school districts. Group I teachers expressed the importance of professional development being ongoing, long-term, and designed to meet the specific needs of their students. In addition, Group I teachers indicated that the design of professional development sessions should include on-level teacher training to meet their specific needs and aspiring improvements in delivering instruction. Throughout group interview discussions, Group I teachers included the significance of extending professional development opportunities to members of the community and parents in a concerted effort to implement district-wide technology successfully. "Professional development is offering the staff and community the opportunity to receive ongoing training at their level to meet the individual needs and goals of the district" (Group I Interview Axial Code Table).

In discussions relating to Long-Term Professional Development, Group I teachers expressed a strong sentiment towards the benefit of staff inclusion and input in selecting district-wide professional development opportunities.

3. Onsite Technical Support

The teachers in Group I identified Onsite Technical Support as a major leadership act (affinity) in implementing technology in rural and economically disadvantaged school districts. Group I teachers raised an awareness on the issue of on-hand availability in providing assistance with daily troubleshooting duties. "Onsite technical support is having a person available as needed to provide assistance with any and all technology" (Group I Interview Axial Code Table). After providing this statement, Group I teachers explained that the reasoning for such generalization was to broaden the scope of the traditional technology campus coordinator from troubleshooting to instructional support. Group I teachers emphasized the idea of an onsite technical support staff who could provide assistance in instructional technology practices, troubleshooting and network problems, and onsite professional development mini-sessions covering newly purchased educational software and district-specific reporting systems.

4. Basic Skills in Equipment Care

Basic Skills in Equipment Care was identified in the conducted group interview as a critical leadership act (affinity) in implementing technology in rural and economically disadvantaged school districts. Throughout the group discussion, Group I described how the approach of preventative maintenance related to the efficiency of cost-effective technology implementation. Finances and resources are often scarce in rural and economically disadvantaged school districts; the preservation of hardware and software allows districts to maximize their internal resources, which inversely affects the educational opportunities of their students. Group I teachers emphasized the significance of understanding basic cleaning and computer systems tools procedures in order to extend the life and efficiency of hardware and software applications. “Basic skills in equipment care is knowing how to preserve the longevity and use of both hardware and software applications” (Group I Interview Axial Code Table).

Group I teachers also explained that these basic skills would benefit budgetary issues and allow for strategic purchasing, planning, and efficient allocation of resources. Furthermore, Group I teachers mentioned that providing basic skills in equipment care also included means of proper storage when school was not in session.

5. Curriculum Integration

Curriculum Integration emerged as a major leadership act (affinity) in implementing technology in rural and economically disadvantaged school districts. Throughout the group discussion, Group I identified the notion of technology being used to facilitate and to supplement instructional practices, and not used as a method of supplanting instruction. In addition, Group I teachers emphasized the concept of aligning all educational technology practices with the content objectives identified in the Texas Essential Knowledge and Skills (TEKS) statewide curriculum. “Curriculum integration is aligning the content areas with technology from PK–6” (Group I Interview Axial Code Table).

Group I teachers stated that the infusion of technology and curriculum extends beyond the scope of regular classroom instruction to encompass remediation and accelerated delivery. Moreover, Group I teachers maintained the importance of curriculum integration and alignment extending to the delivery of instruction to students in special programs.

Affinities: Group II

Group II consisted of the superintendent of Ramirez CSD. This superintendent has practiced in Ramirez CSD for 12 years. The superintendent has the responsibility of infusing technology into the educational system. As a result, the superintendent has taken on the duties of grant writing, strategic budgeting, alignment of professional development activities, building capacity, developing an infrastructure and all other tasks associated with the implementation of technology into Ramirez CSD.

1. Pre-Planning for Accessibility

Group II superintendent validated Pre-Planning for Accessibility as an affinity associated with a leadership act in implementing technology in rural and economically disadvantaged school districts. Group II superintendent indicated that in order to perform a needs assessment and pre-planning for accessibility, three questions must be answered:

1. What do we need?
2. What do we have?
3. What must we do to get it?

In pre-planning for accessibility, Group II superintendent used these three questions to develop a needs assessment to inform budgetary decisions and technological decisions discussed by the board of trustees.

In addition, Group II superintendent emphasized the focus on guiding various stages of the planning process around the instructional needs of students. "Pre-planning for accessibility means that we have to explore means of obtaining technology to instructionally better serve our students, so that a plan can be implemented to get all the technology we need" (Group II Interview Axial Code Table). Group II superintendent discussed pre-planning for accessibility as a method to garner the input of all stakeholders in the educational process.

2. Long-Term Professional Development

Group II superintendent concurred with Group I teachers in naming Long-Term Professional Development as a major leadership act (affinity) in implementing technology in rural and economically disadvantaged school districts. However, Group II superintendent expressed the caveat of selecting professional development primarily on the basis of student needs and the ability to utilize these strategies according to the technological capabilities of the district. "To be effective, professional development in the use of information must ensure that the participants have the hardware, software and connectivity necessary to use the content of the professional development in their classrooms" (Group II Interview Axial Code Table).

Group II superintendent also stressed the benefit of selecting professional development that allowed for teachers to use actual classroom and student data during the training. As a result, professional development establishes immediate relevancy in application and a direct connectedness to the classroom. Lastly, Group II superintendent acknowledged the provision of ongoing support and follow-up activities for teachers immediately after the professional development session. Group II superintendent cited additional professional development sessions, district-wide reporting of newly acquired knowledge, and project-based campus tasks as post-activities that reinforce professional development training.

3. Onsite Technical Support

The view of the Group II superintendent regarding Onsite Technical Support as a major leadership act (affinity) in implementing technology in rural and economically disadvantaged school districts was consistent with Group I teachers. Group II superintendent emphasized two benefits in allowing teachers to receive onsite technical support:

1. Reinforces learning in an environment that is comfortable to the participants and conducive to learning.
2. "Simplifies the logistics of balancing work with weekly schedules of their assignments and activities" (Group II Interview Axial Code Table).

Group II superintendent discussed the continuum of learning for participants in training and how crucial it is to have onsite technical support to provide assistance to participants learning at their own pace. Moreover, providing immediate intervention and assistance can alleviate discouragement that may otherwise occur in the learning process.

After providing this statement, Group II superintendent described the practicality and opportunity of onsite technical support initiating communication and prompting a regular exchange of ideas among staff members. In essence, Group II superintendent embraced the concept of onsite technical support allowing staff members to learn, implement, and continue to gain technology competencies in the exact environment in which they serve.

4. Basic Skills in Equipment Care

Group II superintendent corroborated Basic Skills in Equipment Care as a critical leadership act (affinity) in implementing technology in rural and economically disadvantaged school districts. Throughout the discussion, Group II superintendent related the knowledge of equipment care to the delivery of instruction, in particular equating the ownership and competency of teachers in basic troubleshooting skills to the efficiency of time in delivering instructional practices.

> Teachers need to know the ins and outs of a PC. They should be able to build a PC, install software and setups, troubleshoot, work with peripherals, and connect the network. That is why adequate training must be provided to keep equipment, network, and software running to avoid delays. (Group II Interview Axial Code Table)

Furthermore, Group II superintendent explained the positive effects of hardware and software longevity on cost-effective budgeting for technology. A staff that has a thorough understanding of the basic skills in equipment care can have a tremendous impact on future budgetary items and strategic purchase plans.

5. Curriculum Integration

Group II superintendent validated Curriculum Integration as an affinity in implementing technology in rural and economically disadvantaged school districts. Group II superintendent identified curriculum integration as the "greatest need in the area of professional development in technology" (Group II Interview Axial Code Table). Moreover, Group II superintendent was very active in explaining the importance of teachers' maximizing technology opportunities to enhance and to broaden the scope of student learning.

> It is very important that teachers use technology with a whole new kind of content, taking full advantage of software tools and simulations that can bring learning alive through new resources, new forms of collaboration and increased experiential learning. (Group II Interview Axial Code Table)

Group II superintendent described at length the noticeable difference between a classroom with the additive instructional supplement of technology and a classroom minus technological applications, even at the most basic level of usage. Throughout the description, Group II superintendent indicated a noticeable increase in the passion for student learning and sense of accomplishment through interactive hands-on activities facilitated through the application of technology.

Affinities: Group III

Group III consisted of 8 teachers representing the entire faculty of Matagorda ISD. The average years of teaching experience in Group III was 9 years. Group III teachers serve 79 students in a PK–6 instructional arrangement. Group III teachers demonstrated different levels of expertise in planning and implementing instructional technology in Matagorda ISD.

1. Ongoing Professional Development in Educational Technology

Ongoing Professional Development in Educational Technology was reported by Group III teachers as a leadership act (affinity) in implementing technology in rural and economically disadvantaged school districts. During the interview, Group III explained ongoing professional development as “staff development that enables teachers to utilize multimedia equipment and hardware applications on a daily basis” (Group III Interview Axial Code Table).

Group III teachers further qualified this statement by expressing the need for an ordinate match between the actual daily needs of the staff and the focus of the professional development activity, allowing for a regular and consistent practice of gained knowledge. Hence, this explains the notion of ongoing professional development becoming institutionalized within both the organization and delivery of instruction. In addition, Group III placed an emphasis on staff development activities that allowed for the participants to utilize practical hardware and software technologies throughout the training session.

2. Onsite Technical/Instructional Faculty Member

Group III validated the acquisition of an Onsite Technical/Instructional Faculty Member as an obvious leadership act (affinity) in implementing technology in rural and economically disadvantaged school districts. In review of the transcribed notes, Group III fancied the term "techno-teacher" as a descriptor for the type of staff member desired. Group III stated that a techno-teacher would be advantageous, in particular, to a rural and poverty school attempting to overcome the scarcity of resources by maximizing personnel into multiple roles and duties. If afforded the opportunity to employ a techno-teacher, Group III entertained the idea of a staff member that possessed technological skills and the practitioner knowledge of deploying technology at the classroom level.

Group III teachers were strikingly explicit in determining the two most important duties exercised by the techno-teacher: "A professional who can provide full-time technical assistance to teachers as well as instruction to students" (Group III Interview Axial Code Table).

3. Neighborhood Network Connectivity

The affinity of Neighborhood Network Connectivity deals with the role of accessibility in technology implementation. Group III teachers confirmed network connectivity as an essential leadership act (affinity) in implementing technology in rural and economically disadvantaged school districts. Although this affinity may not register as a concern with some school districts, it remains prevalent among many rural and poverty school districts in Texas.

During the interview the staff emphasized the importance of acquiring neighborhood network connectivity to communicate with students, teachers, administration, and other members of the educational community outside the confines of the district. In addition to network connectivity facilitating communication, Group III teachers were partial to the functionality of comprehensive and district-wide reporting measures based upon data used for educational purposes. Group III teachers communicated the need for "intra-school and inter-school connectivity" in establishing an efficient process in communicating and reporting student data to other staff members and providing another means for community and parent outreach (Group III Interview Axial Code Table).

4. Strategic Allocation of Resources

Group III teachers identified Strategic Allocation of Resources as a major affinity in implementing technology into rural and economically disadvantaged school districts. Group III identified this affinity as a necessity in attempting to provide students the proper education based upon the technology requirements listed in the TEKS state curriculum. "The acquisition and efficient utilization of funds and equipment are needed in order to meet the educational requirements of technology TEKS" (Group III Interview Axial Code Table).

Group III teachers listed a variety of methods to achieve an efficient allocation of resources, considering the priorities of the school district. In the area of technology, Group III teachers alluded to strategic purchasing of hardware to ensure longevity and strategic purchasing of software to allow for continued and sustained capabilities of existing educational technology. Group III teachers also verbalized a list of considerations prior to strategic purchasing, which required performing a needs assessment to align predetermined instructional goals with a generated list of needs essential to achieving these instructional goals. Group III also reiterated that the process of a needs assessment was reflected in most data-driven educational decisions in the group's school district.

5. Curriculum-Driven Software Integration

The affinity of Curriculum-Driven Software Integration identified by Group III emerged from the previous discussion related to the Strategic Allocation of Resources affinity. However, there was an overwhelming feeling among Group III teachers of its value; therefore, it developed into a stand-alone affinity. Group III deemed this affinity as vital in student learning. There was a focus on providing a smooth fusion between technology and curriculum through aligning content-based instructional software with the TEKS objectives in each foundational subject (Group III Interview Axial Code Table).

Group III teachers also mentioned the need for purchasing curriculum-based software that incorporated ideas for technology that were age-appropriate to specific student grade levels. Group III teachers had experienced difficulty implementing most curriculum-based software programs because the software is usually blanketed for multiple grade levels. In essence, Group III teachers reported multi-grade software as a contradiction in efficient strategic purchasing because it contains broad-based but stringent capabilities that are inflexible for gauging accuracy in diagnosing student's ability and providing explicit intervention strategies focusing on specific domains of learning.

Affinities: Group IV

Group IV consisted of the superintendent of Matagorda ISD, who has practiced there for 1 year after being employed as an administrator in surrounding school districts. The superintendent had the responsibility of sustaining and improving district-wide educational technology. Furthermore, the superintendent was charged with ensuring that the capacity and knowledge of staff members enabled the effective and efficient use of technology in facilitating student learning.

1. Ongoing Professional Development in Educational Technology

Group IV superintendent validated Ongoing Professional Development in Educational Technology as a conspicuous affinity associated with a leadership act in implementing technology in rural and economically disadvantaged school districts. Group IV superintendent described his involvement in this affinity as encouraging his staff to continue their education within the budgetary means appropriated by the school district: “My role is to support personnel participation in their continued education and curriculum based workshops abiding by budgetary restraints” (Group IV Interview Axial Code Table).

Group IV superintendent also suggested that staff members need to be self-motivated in their endeavor to increase their own capacity and knowledge through professional development. In addition to sought-after opportunities for professional growth, Group IV superintendent expressed the need for staff members to share their newly acquired competencies with the remaining faculty due to the lack of district funds to send multiple participants to training. As a result, staff members become instructors of information as well as learners, thus internalizing and reinforcing their learning. "The staff needs to be able to learn new technological support systems and techniques, and be able to share relative information with peers through self-initiation" (Group IV Interview Axial Code Table).

2. Onsite Technical/Instructional Faculty Member

For Group IV superintendent, the affinity of Onsite Technical/Instructional Faculty Member posed a dichotomy. Albeit for different reasons from Group III, Group IV superintendent could see the benefits of having an onsite technical/instructional staff member. However, Group IV superintendent also came to the realization that it would not be feasible to pay an employee of this skill the appropriate salary. Moreover, Group IV superintendent pointed out that the salary of a staff member with these qualifications in a larger district or even in other arenas in education would far exceed even a superintendent's salary in a rural and economically disadvantaged district. Therefore, the feasibility in compensating a technical/instructional employee would be virtually nonexistent, which would in turn affect any possibility for recruitment or retainment.

Group IV superintendent expressed the idea of expanding this concept into employing staff members with various levels of expertise in technical support and possibly developing a funding formula for additional stipends for faculty members per qualification. This response from Group IV superintendent provided a cost-effective solution in protecting the intent of acquiring a technical/instructional staff member and yet still remain inside budgetary boundaries.

3. Neighborhood Network Connectivity

Group IV superintendent felt that it was critical to have a working Neighborhood Network Connectivity. Moreover, the Group IV superintendent identified Neighborhood Network Connectivity as an affinity essential to effectively implementing technology in rural and economically disadvantaged school districts. Group IV superintendent described this affinity as a method "to provide a technological avenue of communication between the community member and the educator in a cost effective manner" (Group IV Interview Axial Code Table).

Group IV superintendent explained that neighborhood network connectivity would reduce district expenditures by producing electronic communications and complex reporting systems that would apprise community members and parents and guide the staff in an informative, concerted effort toward attaining successful student achievement. Another added benefit indicated by Group IV superintendent was that neighborhood network connectivity would remove the laborious and expensive process of utilizing staff members to prepare voluminous paper documents for postage and mailing distribution.

4. Strategic Allocation of Resources

Strategic Allocation of Resources emerged from all other affinities as the cornerstone to implementing technology in rural and economically disadvantaged school districts. Group IV superintendent emphasized the importance of conducting a needs assessment prior to determining the allocation of resources: "It is important to conduct a needs assessment, both formal and informal, to provide data in determining the most cost-effective educational system for our students and our community's expectations" (Group IV Interview Axial Code Table).

Group IV superintendent commented that in striving for a cost-effective educational system, the strategic allocation of resources not only maximizes the means of the district, but also allows stakeholders to cast a keen eye on the efficiency of the district, which often leads to discovery of additional resources and applications.

5. Curriculum-Driven Software Integration

Group IV superintendent identified Curriculum-Driven Software Integration as a protuberant affinity in implementing technology in rural and economically disadvantaged school districts. Group IV superintendent felt that it was important to move beyond the acquisition of technology and into the direct implementation of technology impacting and facilitating student learning at the classroom level. Group IV superintendent explained the importance of using technological advancements and programs in motivating students to learn, catering to high-level learners, and pinpointing the specific instructional needs of remedial students through diagnostic measures. "Curriculum software should provide appropriate and effective academic technological support as a remediation and motivational tool in student learning" (Group IV Interview Axial Code Table).

Summary

In conspectus, teachers identified numerous affinities in implementing technology in rural and economically disadvantaged school districts. Group I teachers identified five affinities through a group interactive practice. The five affinities were subsequently confirmed by Group II superintendent through an interview.

Group III teachers also identified five emerging affinities through a group interactive process. Group IV superintendent validated each of the five affinities identified by Group III teachers, with the caveat of adding different explanations derivative of his role as an instructional leader.

The results in this process generated a final list of 10 leadership acts identified and validated by teachers and superintendents in two school districts and deemed as critical affinities in implementing technology in rural and economically disadvantaged school districts. Of this list of 10, six affinities were synonymous with others and could be condensed to three affinities, giving a more refined total of seven leadership acts. These affinities were identified by Group I and Group III teachers and validated by Group II and Group IV superintendents. The matrix in Table 1 categorizes the affinities identified by the four data groups as they appeared in the data collection and analysis process.

Table 1. *Affinity Matrix*

Affinities (leadership acts)	Group I	Group II	Group III	Group IV
Pre-Planning for Accessibility	X	X		
Long-Term Professional Development	X	X	X	X
Onsite Technical Support	X	X	X	X
Basic Skills in Equipment Care	X	X		
Curriculum Integration	X	X	X	X
Ongoing Professional Development in Educational Technology	X	X	X	X
Onsite Technical/Instructional Faculty Member	X	X	X	X
Neighborhood Network Connectivity			X	X
Strategic Allocation of Resources			X	X
Curriculum-Driven Software Integration	X	X	X	X

Research Question 2

What are the perceptions of how these acts of leadership relate to each other?

Data Groups

Members of each data group were asked not only to identify each of the acts of leadership (affinities) in implementing technology in rural and economically disadvantaged school districts, but also to determine how the affinities related to each other. The affinity relationships described in chapter 3 were determined by a group consensus per data group. The Tabular IRD (see Figure 2 for a sample) was developed as a result of the discussion by each data group. The results are identified in the tables listed in this chapter, with the arrows in each table representing the direction of influence on each affinity.

Group I

Members of Group I participated in the group interview activity. The interview was coded per the instructional methods depicted in chapter 3. The coding of the interview resulted in a collective set of data that was gathered and analyzed representative of the entire group. Group I consisted of 4 teachers representing the entire faculty of Ramirez CSD.

In response to research question 1, Group I identified five leadership acts (affinities). Figure 4 shows the resulting IRD, which identifies the perceptions of how these affinities relate to each other. Figure 4 also provides the response given by Group I to research question 2.

Group #1 Tabular IRD														
	1	2	3	4	5	6	7	8	9	10	11	OUT	IN	□
1		↑	↑	↑	↑							4	0	4
2	□		□	↑	↑							2	2	0
3	□	↑		↑	<>							2	1	1
4	□	□	□		↑							1	3	-2
5	□	□	<>	□								0	3	-3
6														
7														
8														
9														
10														
11														

Figure 4. Group I IRD.

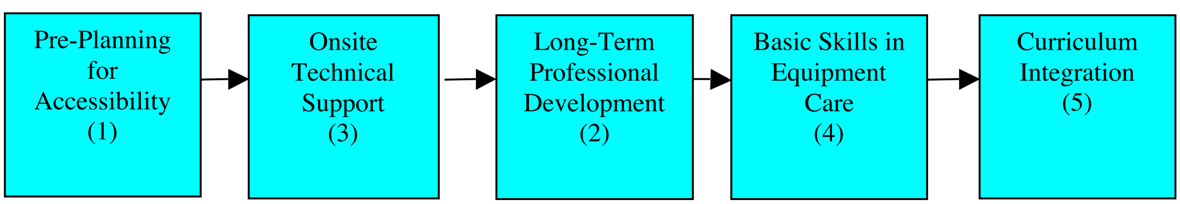

Figure 5. Group I SID.

Tour of the Model

The following is an examination of the SID based on the Group I interview with the entire teaching faculty of Ramirez CSD.

Primary Driver

The leadership act identified as Pre-Planning for Accessibility was the singular primary driver for Group I. In viewing the unsaturated mind-map, Pre-Planning for Accessibility was perceived as having a directional relationship with the remaining leadership acts (affinities) identified in the Group I IRD (Figure 4).

During the Theoretical Code Interview, Group I teachers were asked to develop a unified theoretical statement describing the influence that every leadership act (affinity) had on the others.

Through the data collection process, it became apparent that Group I identified Pre-Planning for Accessibility as the leadership act that had the most pronounced influence on Onsite Technical Support (secondary driver). Group I stated: "Your onsite technical assistance will depend heavily on your facility arrangement and the needs of district and staff" (Group I Interview Theoretical Code Table).

In the Pre-Planning for Accessibility process, the related component of facility arrangement surfaced as the reoccurring theme in discussing the impact of the primary driver on each of the identified leadership acts (affinities).

Acknowledging the impact of Pre-Planning for Accessibility on Long-Term Professional Development, Group I explicitly demonstrated the relationship by stating, “A needs assessment and pre-planning will affect what professional development you will need in order to meet the needs and goals of the district and the students” (Group I Interview Theoretical Code Table).

In further discussion, Group I declared the importance of Pre-Planning for Accessibility being the first step in a technology improvement process, which in turn should drive the selected district professional development options.

Group I explained the influence that Pre-Planning for Accessibility had on the affinity labeled Basic Skills in Equipment Care. Group I highlighted specific examples to include in the pre-planning for accessibility process to ensure longevity and extended life expectancy among hardware items. To expound further, Group I reported this as a measure that would directly affect the faculty’s determination of needed basic skills in technology equipment care. Group I cited clean rooms, proper room temperature, and careful designation for computer storage as critical factors to include in the pre-planning for accessibility process. Moreover, these pre-planning considerations would result in a direct influence on the maintenance of effort in providing technology with appropriate and lasting equipment care.

In discussing the primary driver, Group I noted the significance of Pre-Planning for Accessibility on the identified leadership act termed Curriculum Integration. Although Curriculum Integration was the last topic of discussion, it was proven that the directional influence from the affinity Pre-Planning for Accessibility was by no means minimal in nature. As a matter of fact, Group I explained that particular facility arrangements/allowances such as lab assignments, computer workstations, or even a mobile check-out cart containing a classroom set of laptops would enhance effective curriculum integration. In defining the actual significance, Group I commented, “Increased accessibility to hardware and software programs allows more opportunity for effective curriculum integration” (Group I Interview Theoretical Code Table).

Based on the information collected, Group I identified Pre-Planning for Accessibility as the primary driver directly impacting all other leadership acts deemed as essential in technology implementation in rural and economically disadvantaged school districts.

Secondary Driver

Group I named the leadership act of Onsite Technical Support the secondary driver. However, Group I could only demonstrate Onsite Technical Support as having two major directional influences upon distinguished leadership acts. Group I explained that Onsite Technical Support directly impacted the affinities Long-Term Professional Development and Basic Skills in Equipment Care, but had no bearing on Curriculum Integration. Therefore, the domain identified as the secondary driver lacked much activity and only moved in two directions.

In comporting with this determination, Group I first described the relationship between Onsite Technical Support and Long-Term Professional Development. Group I referred to the unlimited possibilities of a technical support staff member providing meaningful training to teachers, while also building a climate of partnership between the often-distant worlds of technology and foundational content. “The onsite technical assistance staff can set up some of the professional development and train us. This will help us build a good relationship/partnership between teaching staff and technical assistance providers” (Group I Interview Theoretical Code Table).

Similarly, Group I entertained the concept of the onsite technical staff offering ongoing professional development academies to community members and parents to increase the effective use of technology in the homes of children and to aid in rallying outside support for future district-wide technology initiatives.

Group I determined that Onsite Technical Support impacted the affinity Basic Skills in Equipment Care. In adding to the desired responsibilities of such a staff member, Group I felt that a technical support staff member could provide assistance in technology maintenance and upkeep, thus alleviating some of the troublesome tasks associated with teachers of novice technology skill attempting to gain competency. An onsite technical staff member could provide the eye of expertise in monitoring equipment care, daily management of technology and many other contentions. “If you have good onsite technical assistance, the care of your equipment will maintain a monitoring system and sustain tip-top condition and durability” (Group I Interview Theoretical Code Table).

Group I noted that Onsite Technical Assistance had no impact on Curriculum Integration. However, Group I suggested that Onsite Technical Support could afford guidance relating to troubleshooting measures and instructional assistance outside actual curriculum integration. The convoluted responsibilities of an onsite technical assistance provider could pose intricacies impeding any additional tasks involving curriculum alignment and teaming.

Adding to this cascade effect, Group I explained the possibility of tension developing within the technical support provider due to overwhelming duties.

Circulatory/Pivot

Group I classified the affinity Long-Term Professional Development as a circulatory/pivot. This affinity was described as the critical juncture that not only influenced two affinities, but also was influenced equally by two affinities. Long-Term Professional Development was discussed as the leadership act through which all interrelated elements passed in the structure of technology implementation. The two affinities that were affected by Long-Term Professional Development were Basic Skills in Equipment Care and Curriculum Integration. In contrast, the two affinities that influenced Long-Term Professional Development were listed as Pre-Planning for Accessibility and Onsite Technical Support.

Group I teachers believed in many cases long-term professional development has overlooked provisions of equipment care and basic technology understanding. Consequently, teachers often relate to technology at a level of distance and never become intimately involved in its functionalities. Therefore, Group I indicated that the inclusion of basic equipment care to professional development sessions would promote the familiarity of technology and the development of competency related to specific capabilities. “We would like to receive professional development in caring for equipment, it is often never included. This could motivate us to look after our own equipment and realize the importance of longevity" (Group I Interview Theoretical Code Table).

Group I teachers also discussed the influence of Long-Term Professional Development on Curriculum Integration. In prioritizing professional development activities, Group I identified the importance of stemming activities based upon student needs to allow for technology to facilitate the learning process through the vehicle agent of curriculum. To expand further, this provides a logical basis of connectivity between student needs driving professional development and professional development impacting curriculum and instruction. "If you set up your ongoing professional development around the instructional needs of students, then you will impact the way you integrate technology into the curriculum" (Group I Interview Theoretical Code Table).

Secondary Outcome

The affinity classified as a secondary outcome was Basic Skills in Equipment Care. This affinity was influenced by multiple affinities classified as primary or secondary drivers. However, the primary influence on Basic Skills in Equipment Care was Long-Term Professional Development. Group I indicated that in order to inoculate the staff with the knowledge to care for computer equipment, long-term professional development had to consistently include a refresher in equipment care and the maintenance of new software programs. "We would like to receive professional development in caring for equipment, it is often never included. This could motivate us to look after our own equipment and realize the importance of longevity" (Group I Interview Theoretical Code Table).

In concluding remarks, Group I also cited the possibility of the onsite technical assistance member providing training in equipment care on a regular basis. Therefore, it was evident that the affinity of Long-Term Professional Development had a significant influence on the secondary outcome of Basic Skills in Equipment Care.

The secondary outcome had a direct influence on Curriculum Integration as well. Group I described the increase in efficiency and maximization of technological capabilities due to the upkeep and care of overall technology resources. In addition, Group I agreed that basic skills in equipment care would promote a general awareness in consistently utilizing technology and transferring this concept to students as well. Before technology endeavors relating to curriculum integration are slated to begin, it is imperative that teachers receive foundational knowledge on the care of incoming curriculum innovations and technology acquisitions.

Primary Outcome

According to Group I SID (Figure 5), there was one identified primary outcome. The primary outcome described as a leadership act in implementing technology in rural and economically disadvantaged school districts was Curriculum Integration. The IRD (Figure 4) for Group I indicates that three out of the four other affinities influenced the Curriculum Integration affinity, and Curriculum Integration influenced no other affinity. The only affinity identified as having virtually no impact on Curriculum Integration was Onsite Technical Support.

The teachers in Group I stated that onsite technical support offered assistance to staff members in the capacity of troubleshooting instead of actual curriculum integration and alignment. "Onsite technical support really does not relate to curriculum integration. This kind of assistance relates to care and troubleshooting, not instruction" (Group I Interview Theoretical Code Table).

In contrast to this relationship, Group I had numerous perspectives about the influential relationships of each of the other affinities. In all instances the influence that each affinity had on Curriculum Integration has been explained in the previous descriptions.

Group II

Group II consisted of the superintendent of Ramirez CSD. The Group II interview was coded per the instructional methods depicted in chapter 3. The coding of the interview was to validate the affinities identified by the teachers of Ramirez CSD (Group I). In addition, the data gathered resulted in a set of data from Group II superintendent that was analyzed and compared to the Group I teachers from the same school district.

In discussing the responses offered by Group I teachers regarding research question 1, the five leadership acts (affinities) that emerged from the Group I interview were validated by the Group II superintendent. The Group II IRD (Figure 6) identifies the perceptions of how these affinities related to each other through the lens of the Group II superintendent. The IRD (Figure 6) also provides the response given by Group II superintendent to research question 2.

Group #II Tabular IRD														
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**OUT**	**IN**	**□**
1		↑	↑	↑	↑							4	0	4
2	□		□	↑	↑							2	2	0
3	□	↑		↑	↑							3	1	2
4	□	□	□		↑							1	3	-2
5	□	□	□	□								0	4	-4
6														
7														
8														
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11														

Figure 6. Group II IRD.

Figure 7. Group II SID.

Tour of the Model

The following is an examination of the SID based on the Group II interview with the superintendent of Ramirez CSD (see Figure 7). This interview was conducted to validate the five affinities provided by Group I teachers of Ramirez CSD in the group activity.

Primary Driver

The leadership act identified as Pre-Planning for Accessibility by Group I was validated by Group II superintendent as the singular primary driver. Pre-Planning for Accessibility was confirmed as having a directional relationship with the remaining leadership acts (affinities) identified in IRD by Group II (Figure 6).

During the Theoretical Code Interview, Group II superintendent was asked to develop a theoretical statement describing the influence that every leadership act (affinity) had on the others. Through the data collection process it was obvious Group II superintendent concurred that Pre-Planning for Accessibility was the leadership act that had the most pronounced influence on Onsite Technical Support (secondary driver).

> I feel that Pre-Planning for Accessibility affects Onsite Technical Support. Again, once the hardware, software, and connectivity are in place, it is critical that technical support be provided onsite. Teachers learn better in their own familiar surrounding, in which they can exchange ideas with their own colleagues. It also allows them to ask questions relating to their own particular needs and remain individualized. (Group II Interview Theoretical Code Table)

Acknowledging the impact of Pre-Planning for Accessibility on Long-Term Professional Development, Group II superintendent explicitly demonstrated the relationship:

> Once the hardware, software and connectivity are in place, the content for the professional development offering of 3- to 6-hour workshops will have the opportunity to be an effective part of the implementation of technology. Teachers have to be provided with ongoing training and follow-ups to be effective. As new technology comes available teachers have to continue learning on the use of them. (Group II Interview Theoretical Code Table)

Furthermore, Group II superintendent added that pre-planning for accessibility was essential as the initial step in the appropriate development and selection of professional development activities.

Group II superintendent also explained the influence that Pre-Planning for Accessibility had on the affinity Basic Skills in Equipment Care. Group II superintendent had a strong belief that teachers need to be intimately involved with knowing the integral parts of technology as well as the proper maintenance. To explain further, Group II reported that teachers need to organize and arrange their technology hardware and software strategically to allow for proper care.

> Pre-Planning for Accessibility affects Basic Skills in Equipment Care. To be able to care for the equipment, the hardware, software and connectivity have to be in place. Learning the basic skills in equipment care requires that the participant knows everything about the equipment on hand, from learning how to change a computer battery to troubleshooting problems with hardware and software. (Group II Interview Theoretical Code Table)

In discussing the primary driver, Group II superintendent noted the significance of Pre-Planning for Accessibility on the identified leadership act Curriculum Integration. Group II superintendent stressed the importance of a virtual learning environment to facilitate curriculum assignments and tasks. Group II superintendent agreed with Group I teachers that particular facility arrangements such as lab assignments and computer workstations would enhance motive for effective Curriculum Integration. Group II superintendent also commented on the importance of distant learning and videoconferencing capabilities:

> Materials and content can be adapted to foster interaction in a distance learning environment. Contents can be designed for presentations for a distance learning environment and the curriculum can be integrated in the use of the Internet and to support collaborative videoconferencing. (Group II Interview Theoretical Code Table)

Based on the information collected, Group II superintendent certified Pre-Planning for Accessibility as the primary driver directly impacting all other leadership acts deemed as essential in technology implementation in rural and economically disadvantaged school districts.

Secondary Driver

Group II authenticated the leadership act of Onsite Technical Support as the secondary driver. However, Group II superintendent differed from Group I in that Group I teachers could only demonstrate Onsite Technical Support as having two major directional influences upon distinguished leadership acts, which excluded the leadership act Curriculum Integration. Group II superintendent maintained that Onsite Technical Support had a directional influence on Curriculum Integration. Group II superintendent explained that Onsite Technical Support directly impacted the affinities Long-Term Professional Development, Basic Skills in Equipment Care, and Curriculum Integration. Therefore, the domain identified as secondary driver is a phenomenon containing voluminous activity and moving in multiple directions.

In comporting with this determination, Group II described the relationship between Onsite Technical Support and Long-Term Professional Development. Group II superintendent stated that technical support would aid staff in completely understanding their professional development sessions and help guide the process of identifying future needs for future trainings. Group II superintendent offered the following plausible explanation: "Technology requires that the staff have ongoing opportunities for technical education and immediately available technical support. The more the technical support, the more you are able to tailor your professional development and identify needs" (Group II Interview Theoretical Code Table).

Group II superintendent authorized Onsite Technical Support as impacting the affinity Basic Skills in Equipment Care. Group II superintendent described this relationship as a two-fold affinity comparing the role of the onsite technical staff in repairing the actual equipment to the role of the teacher in utilizing basic skills in equipment care for the purpose of maintenance.

> Onsite Technical Assistance affects Basic Skills in Equipment Care in that when something breaks, it is repaired immediately or a replacement is provided, so that loss of productivity is minimized. While basic skills in equipment care for a teacher should consist of cleaning, changing out batteries, network maintenance and troubleshooting. (Group II Interview Theoretical Code Table)

Group II superintendent also noted the impact of Onsite Technical Assistance on Curriculum Integration. Although Group I teachers felt their was no relationship between the two affinities, Group II superintendent indicated an influential relationship. Group II superintendent identified Onsite Technical Support as a means of immediately enhancing instructional strategies in the classroom:

> Onsite Technical Support affects Curriculum Integration in that this kind of support is in relation to professional development. It is instructional technology support in which a teacher gets help using the technology for instruction. The teacher gets help on how to use an instructional technique, a Web site or a piece of software. Just a few minutes of help would be necessary to be successful with a different type of tool. (Group II Interview Theoretical Code Table)

Circulatory/Pivot

The affinity classified as a circulatory/pivot was Long-Term Professional Development. This affinity was discussed as validated as the bottle-necking agent that not only influenced two affinities, but also was influenced equally by two affinities. Long-Term Professional Development was corroborated as the leadership act through which all interrelated elements passed in the structure of technology implementation. According to Group II superintendent, the two affinities that were affected by Long-Term Professional Development were Basic Skills in Equipment Care and Curriculum Integration. The two affinities that influenced Long-Term Professional Development were listed as Pre-Planning for Accessibility and Onsite Technical Support.

Group II superintendent reiterated that in the past long-term professional development had overlooked provisions of equipment care and basic technology understanding. Consequently, staff members often related poorly to technology, sometimes having less understanding than the students. Therefore, Group II superintendent indicated that the inclusion of basic equipment care to professional development sessions would allow the teachers to once again be the head of the classroom by familiarizing themselves with the functionalities of the computer. In addition, this would provide teachers with the confidence to explore future classroom technology innovations.

Group II superintendent also discussed the influence of Long-Term Professional Development on Curriculum Integration. Group II superintendent identified professional development as the key to any change process involved in a school district. “Professional development affects curriculum integration in that it is the main thing that effects change in a school” (Group II Interview

Theoretical Code Table). To expand further, building capacity in staff builds trust and confidence as well, which in turn promotes the concept of successful change in the midst of its natural implementation dips.

Secondary Outcome

The affinity validated as a secondary outcome was Basic Skills in Equipment Care. This affinity was influenced by multiple affinities classified as primary or secondary drivers. In addition, Group II superintendent designated the primary influence on Basic Skills in Equipment Care as Long-Term Professional Development. Group II superintendent indicated that basic skills in equipment care were missing from many professional development offerings.

In further dissection of the secondary outcome, Group II superintendent elaborated on the effects of Basic Skills in Equipment Care on Curriculum Integration. Group II superintendent emphasized the relationship between equipment preservation and technological curriculum integration: “Basic Skills in Equipment Care can encourage you to integrate technology with curriculum. If equipment is not cared for, curriculum cannot be used effectively” (Group II Interview Theoretical Code Table).

Primary Outcome

According to the Group II SID (Figure 7), there was one identified primary outcome. The primary outcome described as a leadership act in implementing technology in rural and economically disadvantaged school districts was Curriculum Integration. The IRD (Figure 6) for Group II superintendent indicated that all other affinities influenced the Curriculum Integration affinity and Curriculum Integration influenced no other affinity. This was slightly different than the Group I IRD (Figure 4), which indicated that three out of four affinities (excluding Onsite Technical Support) influenced Curriculum Integration. Nonetheless, both Group I teachers and Group II superintendent listed Curriculum Integration as their primary outcome.

Group III

Members of Group III participated in the group interview activity. The interview was coded per the instructional methods depicted in chapter 3. The coding of the interview resulted in a collective set of data that was gathered and analyzed representative of the entire group. Group III consisted of 8 teachers representing the entire faculty of Matagorda ISD.

In response to research question 1, five leadership acts (affinities) emerged from the Group III interview. The Group III IRD (Figure 8) identifies the perceptions of how these affinities related to each other. Figure 8 also provides the response given by Group III to research question 2.

Group #III Tabular IRD													
	1	2	3	4	5	6	7	8	9	10	11	OUT	IN	Δ
1		←	↑	←	↑							2	2	0
2	↑		↑	←	↑							3	1	2
3	←	←		←	↑							1	3	-2
4	↑	↑	↑		↑							4	0	4
5	←	←	←	←								0	4	-4
6														
7														
8														
9														
10														
11														

Figure 8. Group III IRD.

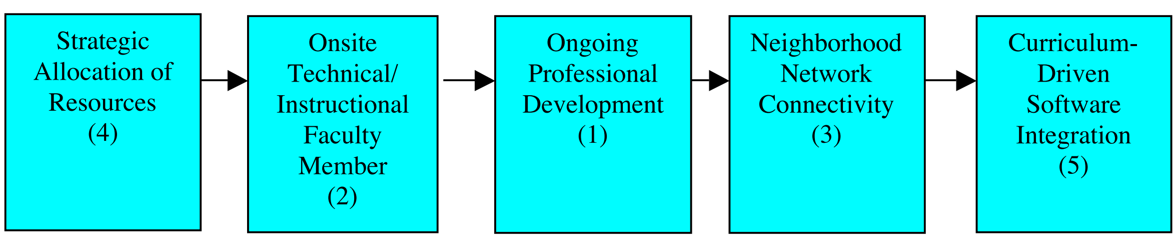

Figure 9. Group III SID.

Tour of the Model

The following is an examination of the Systems Influence Diagram (SID) based on the Group III interview with the entire teaching faculty of Matagorda ISD.

Primary Driver

The leadership act identified as Strategic Allocation of Resources was the singular primary driver for Group III. In viewing the unsaturated mind-map, Strategic Allocation of Resources was perceived as having a directional relationship with the remaining leadership acts (affinities) identified in the Group III IRD (Figure 8). During the Theoretical Code Interview, Group III teachers were asked to develop a unified theoretical statement describing the influence that every leadership act (affinity) had on the others.

Through the data collection process it was apparent that Group III teachers identified Strategic Allocation of Resources as the leadership act that had the most pronounced influence on an Onsite Technical/Instructional Faculty Member (secondary driver). Group III demonstrated the primary steps that must be in place in order to hire a staff member of this caliber: "In order to have enough funds to purchase an onsite technical and instructional member, the district must move and manipulate resources in a strategic manner" (Group III Interview Theoretical Code Table).

In the process of strategically allocating resources in a rural and economically disadvantaged school district, the basic essentials of the primary driver's influence on each of the remaining affinities included a needs assessment and strategic purchasing measures. Group III teachers stressed the significance of these two factors that undergird the strategic allocation of resources, and the importance of having both factors in place before hiring an onsite technical/instructional faculty member. These two components of strategically allocating resources were prevalent throughout every Group III teacher discussion relating to the impact of the primary driver on the remaining identified leadership acts.

In acknowledging the impact of Strategic Allocation of Resources on Ongoing Professional Development in Educational Technology, Group III explicitly demonstrated the relationship, stating, "Strategic allocation of resources and monies will influence the amount of professional development our staff will receive" (Group III Interview Theoretical Code Table).

In further discussion, Group III reiterated that without the strategic allocation of resources the degree and scope of professional development as well as follow-up sessions are often limited and at times nonexistent. In elaboration, Group III teachers remained stern and steady in emphasizing the value of the impact that resource allocation has on professional development opportunities: "Undoubtedly, this staff believes that strategic purchasing, budgeting, and resource allocation is the most important leadership act in implementing technology in a rural and economically disadvantaged school district" (Group III Interview Theoretical Code Table).

Group III explained the influence that Strategic Allocation of Resources had on the affinity labeled Neighborhood Network Connectivity. Group III teachers continually announced the necessity of a rural and economically disadvantaged school district prioritizing to meet the need for district-wide network connectivity and capabilities. Group III stated that "strategically maneuvering resources allows the extension of networking capabilities throughout the district" (Group III Interview Theoretical Code Table).

Group III teachers elaborated on this statement by demonstrating the cost-benefit relationship between strategically utilizing resources to increase network capabilities and the costs and time saved in reporting processes. In relation to this point, Group III teachers pointed out that expanded networking capabilities could also add value to student learning through the efficient reporting and sharing of diagnostic and progress-monitoring student data across multiple grade levels.

In further discussing the primary driver, Group III noted the significance of strategically allocating resources on the identified leadership act termed Curriculum-Driven Software Integration. Throughout the series of conversations, Group III teachers entertained the notion of sharing instructional software across classrooms and possibly even campuses within the district. Group III teachers described the actual significance stating the following: "A connected network will allow teachers to share instructional practices and ideas through having rich discussions based upon practice" (Group III Interview Theoretical Code Table).

Based on the information collected, Group III teachers identified Strategic Allocation of Resources as the primary driver directly impacting the bulk of all other leadership acts deemed as essential in technology implementation in rural and economically disadvantaged school districts.

Secondary Driver

Group III teachers named the leadership act of Onsite Technical/Instructional Faculty Member the secondary driver. Group III teachers indicated that an Onsite Technical/Instructional Faculty Member had a major directional influence upon all other leadership acts, excluding the Strategic Allocation of Resources (primary driver). Group III explained that an Onsite Technical/Instructional Faculty Member directly impacted the affinities of Ongoing Professional Development in Educational Technology, Neighborhood Network Connectivity, and Curriculum-Driven Software Integration. Therefore, the domain identified as the secondary driver possessed much activity and moved in multiple directions.

In comporting with this determination, Group III teachers first described the relationship between an Onsite Technical/Instructional Faculty Member and

Ongoing Professional Development in Educational Technology. Group III teachers referred to the infinite contributions of a technical support staff member equipped with the qualifications of technology skills and competence in the uses of instructional technology. Group III teachers described the assets of this techno-teacher:

> An onsite techno-teacher can help deliver professional development to the staff, so we do not have to travel for professional development. Also the techno-teacher can help monitor the staff and provide feedback to your immediate questions. (Group III Interview Theoretical Code Table)

Group III teachers determined Onsite Technical/Instructional Faculty Member as impacting the affinity labeled as Neighborhood Network Connectivity. Group III teachers explicitly stated that the provision of an onsite technical provider would enable proper and consistent maintenance of the network and its connectivity. As a result, the onsite technical assistance provider would become familiar with the equipment of the district and provide training sessions that were relevant and customarily tailored to the needs of their district.

"The onsite technical/instructional faculty member can train staff in using software, reporting systems and communication for educational purposes" (Group III Interview Theoretical Code Table). Group III noted the impact of an Onsite Technical/Instructional Faculty Member on Curriculum-Driven Software Integration. Group III teachers suggested that an Onsite Technical/Instructional Faculty Member could aid the teachers in the alignment of instructional technology with the state-mandated curriculum (TEKS). Similarly, Group III teachers indicated that such a staff member could also serve as a constant reminder in ensuring that instructional technology strategies act as an adhesive between the state-mandated curriculum and the true needs of each student.

Circulatory/Pivot

The affinity classified as a circulatory/pivot was Ongoing Professional Development in Educational Technology. Similar to the Group I, Group III discussed this affinity as the apex that not only influenced two affinities, but also was influenced equally by two affinities. Ongoing Professional Development in Educational Technology was discussed as the leadership act through which all interrelated elements passed in the structure of technology implementation. The two affinities that were affected by Ongoing Professional Development in Educational Technology were listed as Neighborhood Network Connectivity and Curriculum-Driven Software Integration. Conversely, the two affinities that influenced Ongoing Professional Development in Educational Technology were listed as the Onsite Technical/Instructional Faculty Member and Strategic Allocation of Resources.

Group III teachers reported that Ongoing Professional Development in Educational Technology influenced Neighborhood Network Connectivity. Group III teachers described professional development as another avenue that allows the staff to effectively use different functionalities of the network. Moreover, Group

III teachers described this process as an opportunity for the staff to experience collective learning and to solicit input from each other as well as other stakeholders involved in educational/instructional decisions.

Group III teachers also explained the influence of Ongoing Professional Development in Educational Technology on Curriculum-Driven Software Integration. Group III commented, “The degree and type of professional development we receive will drive the selection of instructional software as well as the implementation of technology into our classrooms” (Group III Interview Theoretical Code Table).

In addition to professional development driving the selection of instructional software, Group III stressed the value of ensuring that the software programs selected are age-appropriate per grade level and aligned with the foundational subject areas identified in the state-mandated curriculum (TEKS).

Secondary Outcome

The affinity Group III classified as a secondary outcome was Neighborhood Network Connectivity. This affinity was influenced by multiple affinities classified as primary or secondary drivers. However, the primary influence on Neighborhood Network Connectivity was Ongoing Professional Development in Educational Technology. Group III raised an eyebrow in this conversation, stating that the point person in the district for professional development would concur that ongoing professional development would allow for staff to effectively use different functionalities of the network. In addition, if teachers received network-related training, staff members would not feel as if they were being pushed out on the plank whenever they tinkered with network problems, risking further complications. Furthermore, this might remove the current mode of deficit thinking in schools, which assumes teachers are not capable of repairing network problems, therefore relying on a specialist to constantly troubleshoot.

The secondary outcome had a direct influence on Curriculum-Driven Software Integration. Group III described the idea of faculty members having the ability to share software on one server as opposed to loading a software program on each individual computer on the campus. Moreover, Group III agreed that the resulting action of utilizing uniform software programs and student data across the entire district would have a definitive impact on student achievement. "A connected network will allow teachers to share instructional practices and ideas through having rich discussions based upon practice" (Group III Interview Theoretical Code Table).

Primary Outcome

According to Group III SID (Figure 9), there was one identified primary outcome. The primary outcome described as a leadership act in implementing technology in rural and economically disadvantaged school districts was Curriculum-Driven Software Integration. The IRD (Figure 8) for Group III indicates that all the other affinities influenced the Curriculum-Driven Software Integration affinity and Curriculum-Driven Software Integration influenced no other affinity. In all instances the influence of each affinity on Curriculum Integration has been explained in the previous descriptions.

Group IV

Group IV consisted of the superintendent representing Matagorda ISD, who participated in an interview. The interview was coded per the instructional methods depicted in chapter 3. The coding of the interview was to validate the affinities identified by the teachers of Matagorda ISD (Group III). In addition, the data gathered resulted in a set of data from Group IV superintendent that was analyzed and compared to the Group III teachers representative of the same school district.

In discussing the responses offered by Group III teachers regarding Research Question 1, the five leadership acts (affinities) that emerged from the Group III interview were validated by the Group IV superintendent. The Group IV IRD (Figure 10) identifies the perceptions of how these affinities related to each other through the lens of the Group IV superintendent. Figure 10 also provides the response given by Group IV superintendent to research question 2, which is slightly different when compared to responses submitted by Group III teachers of the same school district.

Group #IV Tabular IRD														
	1	2	3	4	5	6	7	8	9	10	11	OUT	IN	▯
1		▯	↑	▯	↑							2	2	0
2	↑		↑	▯	↑							3	1	2
3	▯	▯		▯	▯							0	4	-4
4	↑	↑	↑		↑							4	0	4
5	▯	▯	↑	▯								1	3	-2
6														
7														
8														
9														
10														
11														

Figure 10. Group IV IRD.

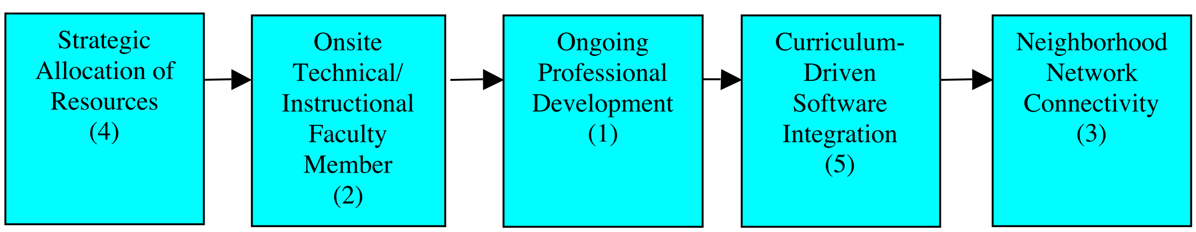

Figure 11. Group IV SID.

Tour of the Model

The following is an examination of the SID based on the Group IV interview with the superintendent of Matagorda ISD. This interview was conducted to validate the five affinities provided by Group III teachers of Matagorda ISD in the group activity.

Primary Driver

The leadership act identified as Strategic Allocation of Resources by Group III was validated by Group IV superintendent as the singular primary driver. Strategic Allocation of Resources was confirmed as having a directional relationship with the remaining leadership acts (affinities) identified in the Group IV IRD (Figure 10).

During the Theoretical Code Interview, Group IV superintendent was asked to develop a theoretical statement describing the influence that every leadership act (affinity) had on the others. Through the data collection process, Group IV superintendent concurred that the Strategic Allocation of Resources had its most pronounced influence on Onsite Technical/Instructional Faculty Member (secondary driver). Group IV superintendent described allocating resources as a process that requires a needs assessment to provide data to determine the most cost-effective educational system for all students. As this primary driver relates to Onsite Technical/Instructional Faculty Member, Group IV superintendent stated,

> The strategic allocation of resources has a direct impact on the purchase of an Onsite Technical/Instructional Faculty Member. Knowing that the cost of appropriate and effective education of children is the primary concern of society and its public servants, all services within in the budget must justify relevancy to this cause. Therefore, providing an effective service by employing an Onsite Technical/Instructional Faculty Member will depend largely on the Strategic Allocation of Resources. (Group IV Interview Theoretical Code Table)

Acknowledging the impact of Strategic Allocation of Resources on Ongoing Professional Development in Educational Technology, Group IV superintendent explicitly demonstrated this relationship by stating that the strategic allocation of resources always drives and affects all professional development activities. Before any professional development is paid for, a local justification process should evaluate the remaining internal resources to determine the need for allocating resources that affect the selection of professional development activities (Group IV Interview Theoretical Code Table).

Group IV superintendent also explained the influence of Strategic Allocation of Resources on the affinity labeled Neighborhood Network Connectivity. "In order to have a Neighborhood Network Connectivity of high capability, a rural poverty district must plan for every phase of this project by strategically utilizing internal resources and funding from outside sources" (Group IV Interview Theoretical Code Table).

To explain further, Group IV superintendent reported that the local board of trustees is required to be involved intimately in approving projects of this nature, thus, planning and allocating resources accordingly.

> For the affinity of Neighborhood Network Connectivity to occur, the local board needs to approve a plan of this magnitude that secures revenue and internal resources for this initiative. However, the superintendent needs to guide this process for efficiency and effectiveness within the organization. (Group IV Interview Theoretical Code Table)

In discussing the primary driver, Group IV superintendent noted the significance of Strategic Allocation of Resources to the identified leadership act Curriculum-Driven Software Integration. Group IV superintendent stressed the importance of facilitating curriculum benchmarks and activities through technological advancements. Group IV superintendent agreed with Group III teachers that in order to utilize these advancements the district must plan to use its resources in a strategic manner.

> The Strategic Allocation of Resources impacts Curriculum-Driven Software Integration. In planning assessments, benchmarks, assignments, and other ongoing yearly activities, it is essential to effective learning that the district use techniques in resource allocation that incorporate strategic purchasing, prioritization, and sound judgments in decision making. These ingredients help secure desired curriculum software. (Group IV Interview Theoretical Code Table)

Based on the information collected, Group IV superintendent certified Strategic Allocation of Resources as the primary driver directly impacting all other leadership acts deemed as essential in technology implementation in rural and economically disadvantaged school districts. Group IV superintendent summarized the significance of the primary driver: “Without strategically allocating resources in a poverty district, a school’s plan for implementing educational initiatives, in particular technological plans, will be destined to plummet” (Group IV Interview Theoretical Code Table).

Secondary Driver

Group IV superintendent authenticated the leadership act of Onsite Technical/Instructional Faculty Member as the secondary driver. Group IV superintendent concurred with Group III teachers by indicating that an Onsite Technical/Instructional Faculty Member had a major directional influence upon all other leadership acts, excluding the Strategic Allocation of Resources (primary driver). Group IV explained that an Onsite Technical/Instructional Faculty Member directly impacted the affinities of Ongoing Professional Development in Educational Technology, Neighborhood Network Connectivity, and Curriculum-Driven Software Integration. Therefore, the domain identified as the secondary driver possessed much activity and moved in multiple directions.

In comporting with this determination, Group IV superintendent first described the relationship between an Onsite Technical/Instructional Faculty Member and Ongoing Professional Development in Educational Technology. Group IV superintendent referred to the infinite contributions of a support staff member equipped with technical qualifications in the uses of instructional technology. Group IV superintendent believed that an onsite support staff member would encourage peer communication in discussing professional development activities. Group IV superintendent explained that acquiring such a staff member would “support existing and new technology techniques that will encourage technology implementation among staff and the initiative to share developing ideas in technological advancements” (Group IV Interview Theoretical Code Table).

Group IV superintendent determined Onsite Technical/Instructional Faculty Member as impacting the affinity labeled Neighborhood Network Connectivity. Group IV superintendent explicitly stated that the provision of an onsite technical provider would enable proper and consistent maintenance of the network and its connectivity. As a result, this would indicate and reflect a forthright dedication at the district level to support the proper care of technology in an educational environment, thus supporting the implementation of technology and its usage at the classroom level. Group IV provided the following statement of support: “An onsite technical/instructional faculty member would exemplify the dedication to support and maintain technology, which in turn provides consistent access in a proactive manner” (Group IV Interview Theoretical Code Table).

Group IV superintendent also noted the impact of an Onsite Technical/Instructional Faculty Member on Curriculum-Driven Software

Integration. Group IV staff member emphasized the importance of an onsite technical support staff member not only to provide professional development, but also to signify confidence and immediate accessibility to support teachers in implementing new technology successfully. In addition, constant support would allow teachers a greater opportunity to experience successful technology innovations and ideas, therefore increasing their appetite for knowledge and skills in the use of educational technology.

> An onsite technical faculty member would impact curriculum integration by providing constant training and support to teachers, allowing them to reach confidence in skills and content. This ripple will then transfer to the successful implementation of new and existing technology. (Group IV Interview Theoretical Code Table)

Circulatory/Pivot

The affinity classified as a circulatory/pivot was Ongoing Professional Development in Educational Technology. Similar in the case of Group II superintendent, this affinity was discussed as the apex that not only influenced two affinities, but also was influenced equally by two affinities.

Ongoing Professional Development in Educational Technology was discussed as the leadership act through which all interrelated elements passed in the structure of technology implementation. The two affinities that were affected by Ongoing Professional Development in Educational Technology were listed as Neighborhood Network Connectivity and Curriculum-Driven Software

Integration. In contrast, the two affinities that influenced Ongoing Professional Development in Educational Technology were listed as the Onsite Technical/Instructional Faculty Member and Strategic Allocation of Resources.

Group IV superintendent agreed with Group III teachers that ongoing professional development would add another avenue allowing the staff to use effectively different functionalities of the network. Group IV superintendent implied that ongoing professional development would equip teachers with the ability to utilize more efficiently networking capabilities. Moreover, Group IV superintendent even expressed the idea of well-trained teachers empowering members of the community to further explore educational resources:

> Professional development affects network connectivity by providing the staff with the competent communication and teaching capabilities that will hopefully initiate and support the community to use communication measures and educational resources for interacting with the district and furthering their education. (Group III Interview Theoretical Code Table)

Group IV superintendent also explained the influence of Ongoing Professional Development in Educational Technology on Curriculum-Driven Software Integration. Group IV superintendent commented, “The ongoing acquisition of knowledge and competent skills of technology initiates successful implementation of software integration” (Group IV Interview Theoretical Code Table).

In addition to professional development promoting successful infusion of software, Group IV superintendent stressed the value of teachers becoming more familiar and selective in identifying appropriate software from vendors to meet the exact needs of their students.

Secondary Outcome

The affinity validated as a secondary outcome was Curriculum-Driven Software Integration. This affinity was influenced by three affinities classified as primary or secondary drivers. The secondary outcome designation of Curriculum-Driven Software Integration differed from that of Group III teachers of the same district, who designated Neighborhood Network Connectivity as the secondary outcome. Group IV superintendent actually reversed the appointment of the secondary and primary outcomes outlined by Group III teaching staff. Group IV superintendent indicated Curriculum-Driven Software Integration as primarily influencing the affinity Neighborhood Network Connectivity. Group IV superintendent described this anomaly by stating that basic technological components must be in order before network connectivity can be accessed. Group IV superintendent detailed the foundational components as follows: "Curriculum-Driven Software Integration provides a building block toward accessing Neighborhood Network Connectivity. There must be software, hardware, instructional and technological systems in place before any networking can be accessed" (Group IV Interview Theoretical Code Table)."

In further dissection of the secondary outcome, Group IV superintendent emphasized the possible dichotomy in viewing this relationship. Acknowledging the point of view of Group III teachers, which expresses the residual effect that the proficient use of network connectivity can have on the deployment and implementation of actual curriculum software, Group IV superintendent chose a different viewpoint. Group IV superintendent approached Curriculum-Driven Software as the driver that must precede Neighborhood Network Connectivity, simply because it is an essential technological component that feeds an entire networking system. Nonetheless, both Group III teachers and Group IV superintendent identified Curriculum-Driven Software Integration as an outcome.

Primary Outcome

According to the Group IV SID (Figure 11), there was one identified primary outcome. The primary outcome described as a leadership act in implementing technology in rural and economically disadvantaged school districts was Neighborhood Network Connectivity. The IRD (Figure 10) for Group IV superintendent indicated that all other affinities influenced the Neighborhood Network Connectivity affinity and Neighborhood Network Connectivity influenced no other affinity. This was slightly different from the Group III IRD (Figure 8), which indicated that Curriculum-Driven Software Integration was the primary outcome. Nonetheless, both Group III teachers and Group IV superintendent listed Neighborhood Network Connectivity as an outcome. In all instances the influence that each affinity had on Neighborhood Network Connectivity (primary outcome) has been explained in the previous descriptions.

Summary

The cause-and-effect relationships among these affinities were clearly described by Group I and Group III teachers and validated by Group II and Group IV superintendents. Group I and Group III teachers did so through dialogue in a group process; Group II and Group IV superintendents did so through an individual interview process.

The interviews with teachers and superintendents in two rural and economically disadvantaged school districts were conducted in four groups. The interviews were reviewed to determine axial and theoretical codes. The theoretical codes revealed the directional relationships via the IRD, which assisted in the development of a SID. The SIDs assisted in defining the drivers and outcomes among the affinities identified as the leadership acts in implementing technology in rural and economically disadvantaged school districts. The directional relationships among the affinities were clearly evident as a result of developing the SID models for each data group. The teachers' perceptions of the effect of the factors on each other were clearly documented. In addition, the validation of these perceptions by the superintendent in each perspective district were documented. Table 2 shows the final outcomes of all four groups.

The next chapter will discuss the findings and recommendations for implementation and future study.

Table 2. *Affinity Driver/Outcome Relationship Matrix*

Drivers and outcomes	Group I	Group II	Group III	Group IV
Primary drivers	Pre-Planning for Accessibility	Pre-Planning for Accessibility	Strategic Allocation of Resources	Strategic Allocation of Resources
Secondary drivers	Onsite Technical Support	Onsite Technical Support	Onsite Technical/ Instructional Faculty Member	Onsite Technical/ Instructional Faculty Member
Circulatory/Pivot	Long-Term Professional Development	Long-Term Professional Development	Ongoing Professional Development in Educational Technology	Ongoing Professional Development in Educational Technology
Secondary outcomes	Basic Skills in Equipment Care	Basic Skills in Equipment Care	Neighborhood Network Connectivity	Curriculum-Driven Software Integration
Primary outcomes	Curriculum Integration	Curriculum Integration	Curriculum-Driven Software Integration	Neighborhood Network Connectivity

CHAPTER 5: SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

The purpose of this study was to identify the leadership acts of technology implementation in rural and economically disadvantaged school districts as perceived by teachers and validated by superintendents in Ramirez CSD and Matagorda ISD. Secondly, the study attempted to identify the directional relationships that each leadership act had on each other and range the order by rank of influence. As a result, this research collected data based upon the perceptions of selected district personnel in these two rural school districts that contain a high number of economically disadvantaged students. Further, this data identified acts of leadership in implementing technology based upon perceptions derived from actual practitioners working under these specific conditions.

Extensive research has been done in the area of leadership acts and responsibilities in school-wide technology implementation (Picciano, 1994). However, limited research is available identifying leadership acts in technology implementation under conditions specific to rural and economically disadvantaged school districts (Hawk, 2001). In addition, to the multiple guidelines that have outlined successful leadership acts of educators in implementing technology (Brody, 1995; Lumley & Bailey, 1997; Picciano, 1998), there are also specific leadership acts that are unique to rural and economically disadvantaged school districts. In fact, many guidebooks and implementation methods tend to overlook the challenges and needs specific to districts featuring these characteristics.

Technology implementation in rural and economically disadvantaged school districts requires unique leadership acts and duties of practicing educators in those school districts. For the most part, research in the field of technology implementation has tended to generalize planning practices across a varied spectrum of school district types (Farrell & Gring, 1993). By illuminating and identifying the acts of leadership in implementing technology in rural and economically disadvantaged school districts, this study contributes to the growing literature in the emerging field of technology implementation in schools.

Thus information collected about the leadership acts in technology implementation become essential for practicing superintendents in rural and economically disadvantaged districts to make informed planning decisions about the implementation of technology. This information can identify the basis for further study, the planning of staff development activities, and enhance the opportunities for practicing educators to implement technology within their schools. Lastly, this study provides a guide to better serve all students, teachers, and staff in Ramirez CSD and Matagorda ISD in effectively implementing technology.

Research Questions

1. What are the acts of leadership in implementing technology in rural and economically disadvantaged school districts?
2. What are the perceptions of how these acts of leadership relate to each other?

Research Design

This study consisted of a qualitative methodology that attempted to describe the perceptions of the acts of leadership in implementing technology in rural and economically disadvantaged school districts. A qualitative approach was utilized for its ability to capture, in depth and detail, the range of experiences from the participants involved (Patton, 2002). Interactive Qualitative Analysis (IQA) was established as the analysis technique utilized to complete this study (Northcutt et al., 1998). An IQA was used to address issues and themes that developed throughout the course of study. The qualitative technique employed analyzed processes, systems, and focus groups to ground the data. This design provided rich contextual data that was analyzed to determine elements and affinities.

Two focus groups of teachers selected from districts that met the study criteria were guided through an IQA activity to identify the leadership acts and their relationships in technology implementation. The interviews were utilized to answer the research questions outlined in this study. Through the IQA process affinities emerged and interview protocols were constructed. In addition, each superintendent from each perspective district validated the affinities through an interview process. The data groups were divided into the following four groups: Ramirez CSD teachers (Group I), Ramirez CSD superintendent (Group II), Matagorda ISD teachers (Group III) and Matagorda ISD superintendent (Group IV). Interview transcripts were coded and evaluated in an effort to validate, repudiate, and detail the affinities reported by each focus group.

The interview codes were further analyzed to determine the effect of the affinities on each other. The coded interviews were used to develop an Interrelationship Diagram (IRD). The IRD was used to develop a cause and effect relationship model called a Systems Influence Diagram (SID). A primary outcome was determined if an affinity was influenced by many others and had very little influence on other affinities. If the opposite occurred, then the affinity was classified as a primary driver. If the influence between the affinities fell within the two extremes of primary drivers and outcomes, it was classified as a secondary driver or a secondary outcome. These tools were used to interpret the data that emerged to answer the research questions outlined in the study.

Major Findings of the Study

The major findings of this study are reported utilizing the framework consistent with the research questions outlined in this study. There were two groups of teachers providing the data collected and analyzed. In addition, there were two groups of superintendents who validated the data reported from the teacher groups. Therefore, the results of this study will be reported in similar fashion.

Research Question 1: Five Acts of Leadership

Group I Teachers/Group II Superintendent

The five acts of leadership in implementing technology in rural and economically disadvantaged school districts according to Group I teachers and validated by Group II superintendent are described below.

1. *Pre-Planning for Accessibility*. Group I teachers viewed pre-planning for accessibility as the nonnegotiable in technology implementation. Group I teachers described this leadership act as a preliminary needs assessment that eventually leads into actual facility planning and arrangement. This act was reported by Group I teachers and validated by Group II superintendent as the primal step in technology implementation.

2. *Long-Term Professional Development*. Group I teachers depicted long-term professional development as an ongoing process containing extensive follow-up. Group I teachers expressed a need for refresher trainings due to the ensconced status of many teachers. In addition, Group I teachers explained the need to extend professional development opportunities into the community. These statements were confirmed and supported by the Group II superintendent.

3. *Onsite Technical Support*. Group I teachers had a predominant view that the need of onsite technical support was second only to pre-planning for accessibility in rank order of importance to technology implementation. Group I teachers discussed the dithering experiences in dealing with technology troubles and the state of disarray that seemingly follows. Throughout their discussions, participants emphasized the convenience of onsite assistance providing time-efficient support that prevents the delay of instructional delivery to students. Group II superintendent described the added benefit of presentable learning opportunities that could prove advantageous for the staff in building capacity as self-sufficient technology advocates.

4. *Basic Skills in Equipment Care*. Group I teachers identified basic skills in equipment care as a reoccurring missing link in most technology initiatives. Group I teachers expressed the philosophy of preventative maintenance and preservation of longevity verses resuscitation methods in handling technology.

Group I teachers suggested that the provision of this training would add to the utilization of cost-effective technology. Group II superintendent reiterated the benefits of these skills in budgeting and purchasing educational technology.

5. *Curriculum Integration*. Group I teachers defined this leadership act as an avenue to align curriculum with educational technology. Group I teachers emphasized the concept of technology supplementing and not supplanting classroom instruction. Group II superintendent expressed the importance of seamless communication among teachers in aligning curriculum and bringing to life new learning experiences for students.

Group III Teachers/Group IV Superintendent

The five acts of leadership in implementing technology in rural and economically disadvantaged school districts according to Group III teachers and validated by Group IV superintendent are described below. It is important to note that even though leadership acts 1, 2, and 5 identified by Group III teachers are slightly different in name from the leadership acts 2, 3, and 5 identified by Group I teachers, the perspectives are relative for the most part.

1. *Ongoing Professional Development in Educational Technology*. Group III teachers embraced ongoing professional development as a means to inundate the staff in the efficient usage of hardware, equipment care, and actual classroom

instructional strategies. Group III teachers illustrated the idea of professional development rejuvenating the staff to seek out innovative applications in educational technology. Group IV superintendent articulated support by portraying the concept of ongoing professional development allowing teachers the opportunity to internalize information related to technology as a means of facilitating student learning.

2. *Onsite Technical/Instructional Faculty Member*. Group III teachers conveyed their desire for a techno-teacher. Group III teachers listed numerous benefits to employing an onsite technical assistant possessing the combined competency of technological skills and knowledge of deploying technology into the classroom. Group IV superintendent supported the concept, but also stated the unlikelihood of affording a person equipped with these qualifications.

3. *Neighborhood Network Connectivity*. Group III teachers identified network connectivity as truly representing the advantages of technology in education from the standpoint of reporting and collaboration of collecting student data. Group III teachers explained the benefits of networking capabilities in communicating with all stakeholders in and outside of the district. In addition, Group III teachers elaborated on the ability to access reported student information across the district in pursuit of making informed educational decisions for

students. Group IV superintendent concurred with these descriptions and stated the additional gain of teachers' developing ownership in students.

4. *Strategic Allocation of Resources*. Group III teachers identified strategic allocation of resources as the most necessary step in technology implementation. Group III teachers embraced the idea of efficiently utilizing district resources and outside funding sources to enhance the quality of technology throughout the district. Teachers discussed strategic allocation of resources as including a needs assessment, measures of strategic purchasing, prioritization of student needs and cost effective analysis. Group IV superintendent agreed with Group III teachers and added the perspective of gathering explicit data before providing succinct information to educators involved in making decisions to meet the needs of students and the expectations of the community.

5. *Curriculum-Driven Software Integration*. Group III teachers viewed curriculum-driven software integration as aligning all educational technology acquisitions with the statewide curriculum standards. Moreover, Group III teachers stressed the importance of purchasing software that is age appropriate and content specific. Group IV superintendent confirmed this notion and explained the significance of utilizing technology to provide appropriate and

effective academic support through remediation and acceleration software programs.

Summary

Group I and Group III teachers identified numerous leadership acts vital to implementing technology in rural and economically disadvantaged school districts. Group I and Group III teachers identified 10 total leadership acts through a group interactive interview process. Those 10 leadership acts were subsequently validated by Group II and Group IV superintendents in an isolated interview.

Group I and Group III each identified five different leadership acts. However, three leadership acts represented commonalities between both groups. These commonalities are:

1. Group I – Long-Term Professional Development, Ongoing Technical Support, and Curriculum Integration.
2. Group III – Ongoing Professional Development in Educational Software, Onsite Technical/Instructional Faculty Member, and Curriculum-Driven Software Integration.

As a result, by name a total of ten leadership acts were identified by both teacher data groups and confirmed by both superintendent data groups; however, by perspective a total of seven leadership acts were identified and validated by the data groups.

Research Question 2: How Acts of Leadership Affect Each Other

Group I Teachers/Group II Superintendent

The perceptions of how these acts of leadership in implementing technology in rural and economically disadvantaged school districts affect each other as perceived by Group I teachers and validated by the Group II superintendent are presented below.

Primary driver. Pre-Planning for Accessibility was the singular primary driver for Group I teachers. Pre-Planning for Accessibility had a directional relationship on all other affinities identified by Group I. The same conclusion was reached and validated by Group II superintendent.

Secondary driver. Onsite Technical Support was the singular secondary driver for Group I teachers. Group I teachers reported that Onsite Technical Support had a directional influence on the affinities Long-Term Professional Development and Basic Skills in Equipment Care. Group I teachers also indicated that Onsite Technical Support had no influence on Curriculum Integration. Group II superintendent also validated Onsite Technical Support as the secondary driver.

However, Group II superintendent explained that it impacted all of the remaining affinities, including Curriculum Integration.

Circulatory/Pivot. Group I teachers cited Long-Term Professional Development as the singular pivot. Group I teachers described this affinity as a conduit of influence. This affinity had a directional influence on Basic Skills in Equipment Care and Curriculum Integration. Group II superintendent validated the same premise.

Secondary outcomes. The affinity classified as a secondary outcome by Group I teachers was Basic Skills in Equipment Care. Basic Skills in Equipment Care only had directional influence on the primary outcome. This conclusion was validated by Group II superintendent.

Primary outcome. One primary outcome was identified by Group I teachers: Curriculum Integration. Group I teachers discussed Curriculum Integration as being influenced by numerous affinities, but having no relationship with Onsite Technical Support. Although viewed in a positive light, Group I stated Onsite Technical Support related strictly to troubleshooting and equipment care, not instruction and curriculum. On the other hand, Group II superintendent viewed Curriculum Integration as being influenced by all remaining affinities, including Onsite Technical Support. Moreover, Group II superintendent felt that Onsite Technical Support was necessary to provide teachers the assistance necessary to infuse and to maximize the opportunities of technology in the classroom. In addition, Group II superintendent cited the reality of an onsite support staff member conducting professional development sessions relating to curriculum and instructional practices.

Group III Teachers/Group IV Superintendent

The perceptions of how these acts of leadership in implementing technology in rural and economically disadvantaged school districts affect each other as perceived by Group III teachers and validated by the Group IV superintendent are presented below.

Primary driver. Strategic Allocation of Resources was the singular primary driver for Group III teachers. Strategic Allocation of Resources had a directional relationship on all other affinities identified by Group III. The same conclusion was reached and validated by Group IV superintendent.

Secondary driver. Onsite Technical/Instructional Faculty Member was the singular secondary driver for Group III teachers. Group III teachers reported that Onsite Technical/Instructional Faculty Member had a directional influence on the affinities Ongoing Professional Development in Educational Technology, Neighborhood Network Connectivity, and Curriculum-Driven Software Integration. Group IV superintendent also validated Onsite

Technical/Instructional Faculty Member as playing a major role in technology implementation.

Circulatory/Pivot. Group III teachers cited Ongoing Professional Development in Educational Technology as the singular pivot. Group III teachers described this affinity as a conduit of influence. This affinity had a directional influence on Neighborhood Network Connectivity and Curriculum-Driven Software Integration. Group IV superintendent validated the same conclusion.

Secondary outcomes. The affinity classified as a secondary outcome by Group III teachers was Neighborhood Network Connectivity. Neighborhood Network Connectivity only had directional influence on the primary outcome. This conclusion was repudiated by Group IV superintendent. Group IV superintendent identified Curriculum-Driven Software Integration as the secondary outcome. Group IV superintendent described Curriculum-Driven Integration as having an impact on Neighborhood Network Connectivity.

Primary outcome. There was one primary outcome identified by Group III teachers: Curriculum-Driven Software Integration. Group III teachers discussed Curriculum Integration as being influenced by all remaining affinities. In contrast, Group IV superintendent identified Neighborhood Network Connectivity as the primary outcome. Further, Group IV superintendent stated that Neighborhood

Network Connectivity was influenced by all remaining affinities, including Curriculum-Driven Software Integration.

Summary

Group I teachers identified five leadership acts for implementing technology in rural and economically disadvantaged school districts. Group I teachers identified the following: primary driver (Pre-Planning for Accessibility), secondary driver (Onsite Technical Support), circulatory/pivot (Long-Term Professional Development), secondary outcome (Basic Skills in Equipment Care), and primary outcome (Curriculum Integration). Group II superintendent validated all five leadership acts and concurred with the same order of directional influence.

Both Group I teachers and Group II superintendent deemed these five leadership acts as essential to technology implementation in rural and economically disadvantaged school districts. Furthermore, Group I teachers and Group II superintendent described the rank of influence for practitioners' perusal in implementing technology.

Group III teachers identified five leadership acts for implementing technology in rural and economically disadvantaged school districts. Group III teachers identified the following: primary driver (Strategic Allocation of Resources), secondary driver (Onsite Technical/Instructional Faculty Member), circulatory/pivot (Ongoing Professional Development in Educational Technology), secondary outcome (Neighborhood Network Connectivity), and primary outcome (Curriculum-Driven Software Integration). Group IV superintendent validated all five leadership acts. However, Group IV superintendent identified a different order of influence. Group IV superintendent reversed the order of the secondary outcome and primary outcome as identified by Group III teachers. Group IV superintendent listed the secondary outcome as Curriculum-Driven Software Integration and the primary outcome as Neighborhood Network Connectivity.

Both Group III teachers and Group IV superintendent deemed these five leadership acts as essential to technology implementation in rural and economically disadvantaged school districts. Furthermore, Group III teachers and Group IV superintendent described the rank of influence for practitioners' perusal in implementing technology.

Major Conclusions

Conclusions of this study are derived from careful examination of the data generated by research questions in the study. The theoretical constructs that surfaced from the study related specifically to the leadership acts identified in technology implementation. In addition, theoretical constructs emerged from how these leadership acts influence each other in a cause-and-effect relationship.

Leadership Acts in Technology Implementation

The responsibility of technology implementation in rural and economically disadvantaged school districts presents a challenge that is unique to these district types. Educators asked to fulfill this role have a comprehensive task in systematically preparing a district to embrace and to maximize the capabilities of educational technology. Numerous leadership acts are identified in this study as playing a major role in technology implementation. These acts include:

1. Pre-Planning for Accessibility
2. Onsite Technical Support or Onsite Technical/Instructional Faculty Member
3. Long-Term Professional Development or Ongoing Professional Development in Educational Technology
4. Basic Skills in Equipment Care
5. Curriculum Integration or Curriculum-Driven Software Integration
6. Strategic Allocation of Resources
7. Neighborhood Network Connectivity

The level and scope of each act as it relates to each other varies in impact of directional influence.

Similar Perceptions of Leadership Acts in Technology Implementation

The perceived effects of leadership acts upon each other are mostly consistent among the data groups. Participants indicated the importance of Professional Development, Onsite Technical Support, and Curriculum Integration. Generally speaking, Onsite Technical Support was deemed the secondary driver and thus declared a necessity in ensuring technology implementation. Second, Professional Development acts as the circulatory/pivot and conduits influence, both receiving multiple influences and having multiple impacts on other leadership acts.

The teachers deemed Curriculum Integration the primary outcome affecting and facilitating student learning within the confines of technology implementation. However, one superintendent identified Curriculum Integration as a secondary outcome. All participants perceived the Curriculum Integration act of leadership as an outcome.

Dissimilar Perceptions of Leadership Acts in Technology Implementation

Leadership acts must respond to unique characteristics of school districts. Participants from the first school district (Group I & Group II) cited the leadership acts of Pre-Planning for Accessibility (primary driver) and Basic Skills in Equipment Care (secondary outcome).

Participants from the second school district (Group III & Group IV) cited leadership acts of Strategic Allocation of Resources (primary driver) and Neighborhood Network Connectivity (secondary outcome reported by Group III teachers, primary outcome reported by Group IV superintendent).

The teacher data groups and the superintendent groups identified these acts of leadership independent of the other school district. These additional leadership acts are listed for perusal in implementing technology in rural and economically disadvantaged school districts.

Recommendations for Implementation

Based upon the results of this study, superintendents and teachers responsible for implementing technology in rural and economically disadvantaged school districts should consider the following:

1. Pre-Planning for Accessibility and Strategic Allocation of Resources are the two leadership acts which had the most impact on all other factors in

technology implementation. These two acts should be the primal steps in planning and implementing technology in these district types. Further, these two acts are supported and grounded in the review of the literature.

2. Onsite Technical Support was validated has an integral step in technology implementation in these district types. Superintendents and teachers implementing technology in rural and economically disadvantaged school districts should carefully consider this act of leadership. Although not highlighted in the review of literature, this leadership act had a substantial impact on all other leadership acts technology implementation.
3. Throughout the process of technology implementation, Ongoing and Long-term Professional Development is recognized as the pivot, which influences and is influenced by other acts of leadership. Superintendents and teachers responsible for implementing technology in rural and economically districts need to consider this as a critical juncture in supporting and facilitating the effective implementation of technology. This act of leadership is supported and validated in the review of the literature.
4. Curriculum Integration is recognized as the least influential act of leadership. Instead it is the most affected by the other leadership acts. Undoubtedly, the degree and effectiveness of technology implementation

will affect the infusion of technology into the curriculum. In addition, curriculum integration is recognized as an important part of the teaching and learning process at the classroom level. Superintendents and teachers implementing technology in these district types should consider the impact of all acts of leadership on curriculum integration, especially with the continued emphasis on assessment and accountability in education.

Recommendations for Further Study

The completion of this study produced a body of research on the leadership acts of technology implementation in rural and economically disadvantaged school districts. Secondly, this study revealed the effects of these leadership acts on each other as perceived by teachers and superintendents these two school districts. The perceptions from these data groups allowed for similar and diverse views to emerge. As a result, the teacher and superintendent data groups provided a core of information reflecting commonalities and differing results and conclusions. Recommendations for further study include:

1. Utilizing a similar framework to extend this study into urban and poverty school districts to determine any shared perceptions or differences regarding leadership acts in technology implementation.

2. Extending on the research in the two school districts to determine the extent to which the technology coordinators and school board of trustees shared the perspectives of the teachers and the superintendent.
3. Extending on the research by adding more data groups to further determine any differences or commonalities between superintendents' and teachers' views in identifying leadership acts in technology implementation.
4. Extending this research to determine if the implementation of technology according to these identified leadership acts equates to higher student achievement.

Conclusions

The responsibility of technology implementation in rural and economically disadvantaged school districts presents an intense challenge and effort. Whether or not it becomes institutionalized and successful depends on various steps and a range of factors. Moreover, there are detailed acts in this process that result from the unique situation presented by the characteristics of the particular school district, for example a rural and economically disadvantaged school district. The approach of technology implementation in these districts requires educators to consider and to understand these acts before embarking upon the challenge.

In many cases, special attention is paid to poverty urban districts with low student achievement. In fact, there are model rural poverty school districts that exemplify outstanding student achievement and successful technology implementation with fewer resources. Ramirez CSD and Matagorda ISD are rural and economically disadvantaged school districts, which are representative in demographics of approximately 300 school districts in Texas. This study has gathered data from the teachers in these two districts and validated the data by the respective superintendents in order to identify these critical acts of leadership unique to these district types in technology implementation. In addition, these acts of leadership have been studied as to how they relate to each other in a pattern of influence. Further, the perceptions of these teacher and superintendent data groups have been collected, analyzed and reported in a concerted effort to add an important piece of research to the existing field of technology implementation in education.

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VITA

Bobby Carl Ott, son of Robert and Sharon Ott, was born in Killeen, Texas on August 3, 1974. Upon graduation from Copperas Cove High School he attended Angelo State University and earned a Bachelor of Science in Kinesiology and English in 1996. Bobby Ott taught English, Health, Career Education and coached in Round Rock ISD and Anson ISD. Bobby Ott began his principalship as the middle school principal in Anson ISD at age 23. He then earned his Master of Education from Angelo State University in 2000.

In completing 3 successful years as a middle school principal, Bobby was nominated for the University of Texas Superintendency Fellows Program. Transferring from the Angelo State Superintendency Program, Bobby was accepted and enrolled into the University of Texas CSP Cycle XIV in the summer of 2001. While attending classes, Bobby was employed in the Division of Curriculum and Professional Development at the Texas Education Agency. One year later he was hired into the Office of Statewide Initiatives with the responsibility of implementing, training educators for, and deploying the governor's statewide educational initiatives.

Bobby has served in various leadership roles and committees at the state level. He is involved in the work of the Texas Math Initiative, Student Success

Initiative, and Governor's Reading Initiative, and serves as the State Director for the Texas Reading First Program. He remains involved in the assessment center and selection of prospective graduate students for the University of Texas Educational Administration Programs. Bobby is most proud of his daughter, Jordan Taylor Ott.

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This dissertation was typed by the author, Bobby Carl Ott.