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Technology leadership at a junior high school: A qualitative case study

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TECHNOLOGY LEADERSHIP AT A JUNIOR HIGH SCHOOL:
A QUALITATIVE CASE STUDY

by

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ABSTRACT

Technology Leadership at a Junior High School: A Qualitative Case Study

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The purpose of this case study was to explore and describe the technology leadership at a junior high school. Technology-related attitudes, behaviors, and skills that have an impact on the school's technology program were examined with emphasis on the building principal. Interviews, observations, and other documents were the means of data collection. This study has implications for people who want to support computers and other educational technology. This case study included the principal, computer specialist, and teachers with varying degrees of computer experience. In addition to Kearsley's three roles of leader, manager, and politician (1991), four other technology-related roles emerged from this study: teacher, model, facilitator, and encourager.

Effective principals should be (a) actively involved with technology. (b) maintain and model personal technology skills. (c) consult knowledgeable people about technology. (d) use school-level shared decision-making such as a technology committee. and (e) serve as a catalyst to motivate low-use teachers. School districts and boards should (a) consult knowledgeable people about technology decisions. (b) help to provide support for technology curriculum integration. (c) consider technology skills and attitudes of potential principals. and (d) require technology growth as part of administrators' professional development. Educational administration programs should expect or require basic computer skills and integrate high level technology skills into the graduate curriculum.

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It was the best of times, it was the worst of times.

--Charles Dickens

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CHAPTER 1

INTRODUCTION

The role of technology leadership is a complex issue. Technology leaders must build and maintain relationships between the school and many other groups including parents, community organizations, and support organizations (Bailey, 1997), a complex undertaking.

Technology seems to be changing more rapidly than ever before. The complexity brought about by this rapid change is causing more and more confusion about the best way to use technology in schools (Bailey, 1997). Fullan and Stiegelbauer (1991) defined technology leadership as a leader's ability to cope with complex change. In addition, traditional views of technology leadership emphasize the importance of charisma and personal strength (Neuman & Simmons, 2000). Recently, technology leadership has focused upon interrelationships among various participants in the school (e.g., principal, teachers, computer specialists) (Schultz, 2000). As schools across the nation are being immersed with new technology, responsibility is being placed primarily on the principal who needs to ensure that technology is used to enhance student learning.

The nature of this complex issue of technology use in schools can be seen by taking a look inside a technology-enriched school. Meister (1984) defines technology-enriched as "extensive use of instructional technologies in a variety of subjects and in a variety of applications, by a large proportion of a school's students and teachers" (p.8).

Balancing such varied roles as leader, manager, and politician has been identified as critical for the successful management of the complex issues faced by principals (Kearsley, 1990).

To better understand these issues, this chapter opens with (a) a description of a technology-using school, (b) a rationale for using educational technology, (c) a discussion of the technology skills of principals, (d) the role of administrative support, and (e) a look at effective use of educational technology. This general background will lead to (a) a discussion of the problem, (b) the purpose of the study, and (c) the rationale for the proposed study.

Background

A View of a Technology-Using School

A visitor to a modern school sees staff and students using a variety of educational technologies during a single day. A group of students is using a CD-ROM encyclopedia to download information and graphics related to their research. Other students are taking pictures of a science experiment with a digital camera and then loading the pictures into a multimedia program they are creating for a group project. Other students are clustered around one of several classroom computers, exploring a World Wide Web (WWW) site. Students in the library are using the school's computer network to finish the science project they began in the science lab earlier in the day. They then email the completed project to the science teacher without leaving the library.

This scenario of student use of technology affects the duties of the principal and also poses administrative problems. For example, the various technologies and resources used must be accessible to all students. Funds must be set aside to update the resources

and provide technology-related professional development for teachers. Quality technology support within a school must include instructional aspects (Ronnkvist, Dexter, & Anderson, 2000) and not just focus on management.

The technology leadership roles of leader, manager, and politician reemerge in other areas of this modern school. The visitor sees teachers in the workroom using computers to connect to the WWW for accessing information from online teacher magazines, educational publishers, or sources of curriculum materials and information. Teachers are using the computer network to track attendance and enter student grades.

Teacher use of technology poses another set of problems for the principal. Most teachers who use computer technologies with their classes do so with little access to technical experts. They have little time to explore how to successfully integrate technology with teaching activities (Becker, 1998). The task, then, falls on the principal to develop a plan for technology (not technical) support for teachers (Ronnkvist, et al., 2000).

As the visitor enters the school office, the office manager is seen answering an email sent by a parent via the school's Web page. The principal is engaging in a video conference with the curriculum office in the district headquarters across town. The principal must provide administrative support to make positive technology differences at the school site. This support extends to the main office area where most decisions are made to ensure that the school is efficiently maintained.

Reasons for Using Computers

Hawkrige, Jaworski, and McMahon (1990) suggested four different views of computer use: (a) social, (b) vocational, (c) pedagogic, and (d) catalytic. The social

rationale holds that learners should be aware of technology's role in society and need instruction to achieve a required level of computer awareness. Advocates of the vocational rationale believe that students should learn to operate computers and related technologies to increase their employment opportunities. Supporters of the pedagogic rationale argue that computer technology provides a reliable and effective platform for instruction. The catalytic rationale suggests that integrated technology will act as a catalyst to change schools for the better in areas not even related to technology. The description of the technology-using school in the section above illustrates some of the facets of the pedagogic and catalytic rationales.

Principals are impacted by these four rationales. Ely (1995) discussed Hawkrige, Jaworski, and McMahon's four rationales and maintains that American schools in the past have concentrated almost exclusively on the social and vocational rationales. Ely argues that today's schools need to be much more concerned with the pedagogic and catalytic rationales. Administrators need to ask the right questions about why, how, and with what results computers are being used. Society would like to see children prepared to function adequately as citizens in a world that is inundated with technologies. Schools should vocationally prepare children to function as professional workers in a technological society. Ely contends that today's schools need to be more concerned with the pedagogic and catalytic rationales.

Pelgrum & Plomp (1993) also discussed Hawkrige, Jaworski, and McMahon's four rationales. They argue that usually not one single rationale guides policy makers. The selection of one or more rationales as being dominant may determine the implementation strategies as well as the budgets needed.

School Administrators' Preparation for Instructional Technology

Principals bear a great deal of responsibility for the instructional technology program in their schools. However, not all school administrators have the expertise or training necessary to make informed decisions about instructional technology use in their schools (Jewell, 1999). Kearsley's (1990) experience with educational administration students who were not prepared to effectively manage technology led him to create a technology leadership training program. Kearsley feels that educational technology leaders need to be able to use technology to solve real problems in schools. Kearsley's (1990) training program included topics such as: (a) strengths and limitations of various technologies, (b) the application of instructional technologies, (c) how to successfully implement technology, and (d) conducting and interpreting evaluations of technology in terms of cost-benefits and educational impact.

Siegel (1995) found that not much attention is paid to the level of technology expertise of principals. Staff development programs, when offered, are usually on specific hardware or software rather than on technology planning, curriculum integration, or budgeting.

In preparing for a technology program, administrators should consider a school technology audit to determine to what degree the school has adequate goals, policies, and budgets (Anderson & Dexter, 2000). Technology programs will not succeed unless administrators and teachers play active roles in these programs. These entities must work together on how best to adapt new technologies to improve learning.

Administrative Support

The argument that the effective use of technology in the classroom is dependent upon the availability of administrative support has been noted in numerous studies of school-wide and classroom-based technology implementations (Garner & Gillingham, 1996; Ginsberg & McCormick, 1998; Means & Olson, 1995; Sandholtz J., Ringstaff, C., & Dwyer, D., 1997). Research has shown that many schools lack adequate administrative support for the optimum use of information and communication technologies. This has created serious obstacles to effective student learning with the aid of technology (U.S. Congress, Office of Technology Assessment, 1995; President's Committee of Advisors on Science and Technology & Panel on Educational Technology, 1997).

Ronnkvist, et al., (2000) report that administrative support is necessary to provide for the instructional needs of teachers (i.e., creating convenient access to necessary resources, providing individualized support, training teachers to integrate technology into the classroom, providing resources as incentives). This underscores the need for creating administrative support. This support includes upgrading equipment much more frequently and acquiring new technologies.

School administrators find themselves with the problem of having to make critical decisions regarding (a) selection, (b) purchase, (c) implementation, (d) integration, and (e) evaluation of instructional technologies often without an adequate skill or knowledge base (Costello, 1997). There are only a few studies that have attempted to determine the elements that constitute administrative support. Thomas and Knezek (1991) reported on competencies related to technology leadership. The competencies were almost all computer hardware or software connected. Montague and King (1985) compared

computer competencies selected by school administrators with those selected by a panel of experts, but because the focus was on competencies for administrative tasks, the findings of the study do not necessarily apply to computer uses that administrators are responsible for in schools.

Ritchie (1996) maintained that technology-related skills are essential as a base for administrators who want to provide administrative support. In addition to technology-related skills, technology-related attitudes and technology-related behaviors will provide a framework to determine what constitutes administrative support.

Effective Use of Educational Technology

The existence of educational technologies in schools does not ensure that these technologies will be used effectively and efficiently for instruction and the improvement of education. What Westbrook (1996) calls the technology infrastructure, which includes (a) software, (b) installation, (c) networks, (d) subscriptions to electronic information services, (e) electrical upgrades and rewiring, (f) classroom reconfiguration, and (g) ongoing technical support, is more expensive than the hardware itself and should not be forgotten when a school makes an investment in technology.

In addition to the technology infrastructure, schools must also pay attention to the instructional infrastructure that helps teachers learn to use the new technology effectively (Bailey, 1997). In *Teachers and Technology: Making the Connection*, published by the Office of Technology Assessment (OTA) (1995), eight requirements for effective use of technology in schools were identified. This model was adapted from the work of David (1994), which determined four requirements for effective use of technology in schools: (a) technology suited to education goals, (b) technical support, (c) access to technology,

and (d) administrative support. Based on evaluations of federally-funded technology initiatives in schools, the OTA (1995) added four more requirements: (a) vision of curricular applications, (b) preservice training, (c) time, and (d) inservice training. Two of the requirements were specifically hardware oriented (e.g., technology access and technical support). The remainder were people-oriented issues that must be addressed by schools wishing to use technology effectively.

Neither the OTA (1995) nor David (1994) described the requirement of administrative support in any significant detail. Supportive administrators may have an influential role in (a) selecting technology appropriate for school goals, (b) creating and sustaining a vision of how technology may be applied to the school curriculum, (c) improving access to technology, (d) planning for staff development in technology, and (e) providing technical support for the school. The remaining requirement of preservice training is related to administrative support through the role administrators have in interviewing and selecting new teachers.

Statement of the Problem

Administrative support is essential to successful technology integration but elements of administrative support have not been identified (Ritchie, 1996). Junior high school administrators are expected to be knowledgeable about instructional technology even though in most cases their educational backgrounds probably did not prepare them for the kinds of decisions they are being called on to make. Administrators need to know how they can best support instructional technology within their schools.

The Purpose of the Study

This study will seek to identify and describe technology-related attitudes, behaviors, and skills possessed by a junior high school principal in a technology-enriched school. In addition, the role of the school principal will be analyzed as it relates to teacher support.

Rationale for the Proposed Study

Technology leadership is of utmost importance in facilitating effective utilization of technology in schools. While there is ample literature on school leadership in general, only a small part of this literature focuses on technology leadership. There seems to be little research, however, on the specific identified roles that constitute technology leadership other than the work of Kearsley (1990). The key writers in the field of instructional technology leadership have depended primarily on experience and opinion, rather than empirical evidence (Bailey & Lumley, 1994; Kearsley & Lynch, 1992). The strongest piece of empirical research to be published is the evaluation of the role of technology in Peakview Elementary School (Wilson B., Hamilton, R., Teslow, J., & Cyr. T., 1994), but this study makes only one passing reference to the positive effect of a supportive principal in the school's successful implementation and integration of technology. It also did not address the junior high school level of education at all.

The focus of this study was to identify and describe the technology-related attitudes, behaviors, and skills of a junior high school principal in a technology-enriched school. Specifically, the questions that guided this study were:

1. What are the instructional technology-related attitudes, behaviors, and skills of a junior high school principal who serves as a leader in a school with a technology-enriched program?
2. What role does this principal play regarding instructional technology in the school?

Chapter Summary

Technology leadership is a complex issue with identified roles of leader, manager, and politician strongly related to effective technology leadership. Success as a technology leader, technology manager, and technology politician depends on the degree of support for teachers as shown by the principal. Even though instructional technology in various forms is found in virtually all junior high schools, principals in those schools are not necessarily adequately prepared by either their professional graduate programs or by their school districts to provide good leadership in the face of complex decisions regarding the effective use of instructional technology.

CHAPTER 1

INTRODUCTION

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Technology seems to be changing more rapidly than ever before. The complexity brought about by this rapid change is causing more and more confusion about the best way to use technology in schools (Bailey, 1997). Fullan and Stiegelbauer (1991) defined technology leadership as a leader's ability to cope with complex change. In addition, traditional views of technology leadership emphasize the importance of charisma and personal strength (Neuman & Simmons, 2000). Recently, technology leadership has focused upon interrelationships among various participants in the school (e.g., principal, teachers, computer specialists) (Schultz, 2000). As schools across the nation are being immersed with new technology, responsibility is being placed primarily on the principal who needs to ensure that technology is used to enhance student learning.

The nature of this complex issue of technology use in schools can be seen by taking a look inside a technology-enriched school. Meister (1984) defines technology-enriched as "extensive use of instructional technologies in a variety of subjects and in a variety of applications, by a large proportion of a school's students and teachers" (p.8).

four teams of key writers were identified by the researcher and they include Bailey and Lumley, Kearsley and Lynch, Spuck and Bozeman, and Thomas and Knezek. These four teams of writers focused on two approaches to the topic. Two teams depended on opinion and experience (Bailey & Lumley and Kearsley & Lynch) while the other two are more researched-based (Spuck & Bozeman and Thomas & Knezek).

Introduction

In the opening chapter of *Computers for Educational Administrators: Leadership in the Information Age*, Kearsley (1990), described educational site administrators as “wearing three hats” in their roles as technology leader, technology manager, and technology politician. While Kearsley was speaking specifically about computers, his comments can be applied to other educational technologies as well. In the role of leader, the administrator must bring about change, inspire others to accept computer technology where appropriate, and help eliminate any barriers to computer use.

As managers, administrators are responsible for the efficient operation of the school and thus need to determine how technology can increase efficiency. In addition, administrators must oversee the successful management and implementation of technology into the school’s curriculum.

In the politician’s role, administrators must achieve a balance between various interests by understanding how technology can best serve the needs of all school constituents and by establishing appropriate policies to bring about the necessary balance. The role of the principal in relation to computer-related technology was an important theme for all of the key writers in the area of leadership and technology. The principal is central to technology leadership.

The Administrator as Technology Leader

Key Writers

Bailey and Lumley (1994), in their handbook entitled *Technology Staff Development Programs: Leadership Sourcebook for School Administrators*, described the building principal as the key player in the technology staff development program. The principal's role included supporting and advancing technology training by (a) modeling technology use, (b) promoting technology as a key school restructuring and/or transforming tool, (c) recognizing and maximizing staff development opportunities, and (d) participating in staff development activities. The principal was further described as a technology leader who guided school improvement or restructuring and who viewed technology as a primary resource for educational change.

Kearsley and Lynch (1992) viewed technology leadership as linked to innovation, dealing almost exclusively with new procedures, policies, and situations. They presented a cultural view of leadership, in which leaders "articulate and create new visions that organizational members can believe in and act upon" (p. 51). For educational technology innovations to be successful, users had to (a) be convinced that the innovation was the best available solution to an educational problem, (b) be willing to support the innovation with resource allocation or reallocation, and (c) be confident that they had the technical skills and support necessary to maintain the innovation.

Kearsley and Lynch (1992) indicated that many problems with technology use in education were largely caused by inadequate technology leadership. These problems included (a) lack of knowledge of how to use technology, (b) lack of adequate time or funds to implement technology, (c) use of technology for its own sake, (d) inequitable

access to technology, (e) poorly designed facilities, (f) poor instruction resulting from negative attitudes about technology, and (g) overt resistance on the part of potential users. Training for technology leaders should include abilities to look critically at technology and its effects on schools, students, teachers, and society. They concluded that the critical perspective is essential because “we do not want a generation of *technocrats* any more than we want *technophobes*” (Kearsley & Lynch, 1992, p. 57).

Summary

Several key writers in the area of technology leadership, then, agreed that the administrator’s role was crucial to the successful implementation of computer-related technologies. They further agreed that, in general, administrators had not been adequately prepared for the role they had to assume. While most administrators have had to learn about technology on the job, a number of writers argued that educational administration programs should include specific, integrated technology components to train those entering the principalship for the technology leadership roles they would have as principals (Cradler, 2000; Bailey & Lumley, 1994; Bozeman & Spuck, 1991; Kearsley & Lynch, 1992; Spuck & Bozeman, 1988; Thomas & Knezek, 1991).

Administrator’s Role in School Technology

In *The State of Teacher Training: The Results of the First National Survey of Technology Staff Development in Schools*, Siegel (1995) found that even though principals were usually key players in purchasing technology, few districts helped them achieve the professional knowledge needed to be key technology leaders and decision-makers. For example, 41% of the schools surveyed did not offer technology staff development programs for administrators.

Becker (1992) concluded that knowledgeable district and school administrators were essential for providing leadership to implement effective teaching and learning with computers and related technologies. His analysis of data from the 1989 International Education Association Computers-in-Education survey found that the greatest computer activity was in schools with a top-down system of district and building-level involvement in technology-related decisions. Schools with a top-down decision making process provided more technology training and were more likely to have (a) school-wide networks, (b) heavily used computer labs, (c) more recent equipment, (d) more powerful computers, (e) more curriculum integration, and (f) greater use of software for higher-order thinking and problem solving than were schools with decentralized, decision-making models that gave teachers a higher degree of autonomy.

Two types of support deemed important for computer implementation as reported by Beach and Vaca (1985) were: (a) direct dollar allocation and (b) personnel policy related to organizational development such as release time or inservice. The study further showed that a flexible leadership style was related to successful implementation. Beach and Vacca suggested that "a consideration for those schools seeking to implement technologically-based programs would be the assessment of the principal's ability to function in an environment requiring a changing leadership style" (p. 45).

Vision for Technology

Another key element of the administrator's technology leadership role was related to vision and change. Dede (1994) saw an administrator's vision as the "ability to communicate desirable, achievable futures quite different from where the present is drifting" (p. 19). The administrator then needed to build faith in others that the envisioned

future could actually be attained. Dede (1994) reminded leaders that “if everyone in your organization likes you, you are not fostering enough change. . . .if you never fail, you are not taking enough risks” (p. 27).

Champion and *change agent* were two terms used to describe the principal’s role in building-level technological change (Levinson, Doyle, and Benjamin, 1993). To integrate educational technology into school culture, the principal needed to move the stakeholders through the steps of (a) planning and building a coalition of supporters, (b) implementing and managing the *shake-down* phase, and (c) institutionalizing the vision by maintaining, enhancing, and standardizing the new processes and procedures.

In their evaluation of an integrated technology program at a junior high school, Zorfass, Morocco, and Lory (1994) identified the principal’s role as the first of four key elements in the success of the program. The other roles were (a) a strong facilitator who guided the process on a day-to-day basis, (b) a site-based management team that made decisions and shared the project leadership, and (c) an interdisciplinary team of teachers that designed the curriculum. Important factors of the principal’s role included (a) taking an active role in setting and articulating schoolwide goals, (b) motivating staff to work toward the vision, (c) encouraging a spirit of inquiry among students and staff, (d) providing the resources to support technology use, (e) supervising and evaluating the process, and (f) fostering collegial relationships.

Implementing innovations and inspiring teachers toward that vision were two of the administrative qualities identified by Miller (1988), who saw administrators as “bold leaders who keep abreast of technological developments” (p. 27). As leaders, principals

must “initiate for changing policies, for introducing new programs and new technological approaches to procedures and programs” (p. 15).

Writers and researchers in the field have seen the technology leader’s role as pivotal to the successful integration of computer-related technologies in schools. Technology leaders “must be aware of current and future instructional technology developments and of the societal issues associated with those developments” (Kearsley, 1990, p. 6) as they seek to build vision and guide their schools in change.

Summary

The role of the administrator as technology leader encompasses many behaviors and skills. The principal’s role included (a) supporting and advancing technology training, (b) promoting technology as a key educational tool, (c) promoting access to technology, and (d) implementing and managing technology. Modeling technology use, motivating and inspiring staff, and supervising and evaluating the process of integrating technology are just a few of the technology leadership skills for a principal. The technology leadership behaviors and skills found in the literature are used by the principal to help bring about change and to eliminate barriers to computer use. No evidence was found that technology leadership attitudes have been researched.

The Administrator as Technology Manager

The second role Kearsley (1990) described for administrators dealing with technology was that of manager, under which, the vision and planning are developed through day-to-day and long-range management. This management role included using technology for administrative productivity (e.g., computerized attendance and record keeping) as well as relating technology to instructional and curricular decision-making.

Key Writers

Bailey and Lumley (1994) emphasized how the principal managed the ways in which instructional technologies impact instruction, especially through a technology-oriented staff development program. When administrators participated in the staff development program, they modeled the use of emerging technologies. Bailey and Lumley (1994) recommended that principals participate in staff development activities with teachers, rather than in segregated, administrators-only staff development. They argued that “modeling what is being philosophically espoused is one of the most important skills of an administrator who seeks to be a technology leader” (Bailey & Lumley, 1994, p. 59).

The five potential benefits from strong technology effectiveness presented by Kearsley and Lynch (1992) were all related to the management role of the administrator; “improved academic achievement by students, improved student attendance and reduced attrition, better vocational preparation of students, more efficient administrative operations, and reduced teacher/staff burnout and turnover” (p. 54). Academic administration could be improved through technology-related operations such as optical test-scoring systems, student registration, class scheduling, and specialized software to monitor facilities and budgets (Bailey & Lumley, 1994).

Use of instructional technologies could renew teachers’ enthusiasm and interest in teaching, though the administrator would have to be careful to allow adequate time for teachers to learn new programs through hands-on practice. If teachers had negative attitudes about instructional technologies or had not been adequately trained, poor instructional results might occur (Kearsley & Lynch, 1992). Kearsley’s book, *We Teach*

with Technology (1992), emphasized the modification of teaching techniques that would occur when teachers and students worked together to create a context in which technology was an integral part of the curriculum.

Personnel

Personnel management is a policy issue frequently viewed as a way to improve technology integration in schools. Ricketts' (1990) survey found that overcoming teacher resistance was one of the three greatest barriers to full, appropriate use of computers in classrooms, an obstacle which schools could overcome by hiring technology-savvy teachers. Other researchers mentioned the importance of giving hiring priority to new teachers who either already possessed baseline technology skills or who were committed to learning to use technology in instruction (Becker, 1994; Cory, 1990; Kearsley, 1990; Kearsley & Lynch, 1992; Lumley, 1993). Personnel commitments in hiring and supporting full-time school-level technology/computer coordinators were recommended to increase the effective use of instructional technologies (Becker, 1994; Kearsley, 1990).

Cory (1990) recommended four personnel-related actions to school boards who would like their districts to become instructional technology leaders.

1. Hire a district-level director of instructional technology programs.
2. Establish a lead teacher for technology at each school.
3. Hire full-time technology lab assistants for each lab to work with the technology teacher.
4. Require annual technology-related staff development for all administrative and supervisory personnel.

Finances

A lack of financial support of computer-related technologies was frequently found to be the number one obstacle to effective computer use in schools (Ginsberg & McCormick, 1998; National Education Association, 1993; Siegel, 1995). Wilson et al. (1994) recommended that maintenance, upgrade, and staff development costs be built into school budgets, especially since “schools often suffer from a pattern of large and sudden technology expenditures followed by a long period of benign neglect (p. 213). Siegel (1995) found that teacher technology training typically accounted for only 8% of the technology budget, with more than a quarter of the schools surveyed (28%) allocating no money at all for training.

Bailey and Lumley (1994) noted that budgets should be reanalyzed and perhaps reprioritized to adequately cover technology needs. Becker (1994) found that exemplary computer-using schools made higher demands on their school resources and still encountered problems in their schools such as (a) not enough computers and not enough space for them, (b) out of date equipment, (c) software that was not pedagogically sound, and (d) non-working computers.

Administrative Uses of Technology

Limited research has focused on how school administrators make use of technology in the day-to-day management of schools (Means & Olson, 1995; Bozeman & Spuck, 1991; Miller, 1988). Donatucci (1994) advocated principals using technologies such as (a) voice mail, (b) electronic calendars, (c) networked computers, and (d) intra-district email to enhance their day-to-day tasks. Familiarization with technologies like these would help the principal become “much more proactive in approaching

administrative challenges” (p. 14). To help principals achieve competency in using technology, Donatucci advocated principal-to-principal training and support as well as staff development for all members of the administrative team (e.g., secretaries, assistant principals, and other key people).

Staff Development for Technology

Teachers always have a need for more training in technology. Teachers feel that technology is an integral part of the process of educating their students and see a need for more technology in their classrooms (Clark, 2000). Administrators must find a way to ensure technology is an integral part of all classroom instruction.

The most efficient and effective way for administrators as technology managers to influence classroom practices associated with computer-related technologies has been through staff development (Bailey, 1997; Bailey & Lumley, 1994; Ely, 1995). Yet surveys of teachers consistently have shown that the biggest obstacle to effective instructional use of computer-related technologies, next to budgetary restraints that limit availability of computer-related technologies, has been the lack of teacher training (National Education Association, 1993; Siegel, 1995).

Teachers and administrators vary in their experience with technology. These variations have been described in different ways. Newsom (1996) quotes a metaphor from a 1992 issue of the Newsletter of the Institute for the Study of Technology in Education, which divided teachers into three levels: (a) explorers (i.e., those who scout the territory, try new equipment and software, new implementation strategies), (b) pioneers (i.e., those who follow the lead of the explorers but need a little more support), and (c) settlers (i.e., those who require explicit directions and support) (p. 215). Bailey

and Lumley (1994) suggest different staff development approaches for use at different levels of technology adoption. They described teachers as (a) high-end users (i.e., those on the leading edge of technology who usually experiment with emerging technologies and learning methods), (b) moderate users (i.e., those who make use of available technology but are not “deeply immersed”), (c) low-end users (i.e., those who make limited use of technology), (d) nonusers (i.e., those who do not make use of technologies in learning activities), and (e) technophobes (i.e., those who fear, hate, despise, or distrust technologies) (pp. 145-147).

Moore (1991) analyzed how a new technology product attracts new customers throughout its technology adoption life cycle. Innovators, the smallest group of consumers, purchase new technology products just for the joy of exploring innovations. Early adopters soon follow the lead of innovators and see the benefits of a new technology. A time gap separates the next group that begins adapting technology. The early majority (i.e., about one-third of the consumers) want to know the value of a technology product before purchasing it. The late majority (i.e., again about one-third of the total) are “less comfortable with their own ability to handle a technology product” and wait until the product is an established standard. The last group, the laggards (i.e., about as large as the innovators and early adopters combined), don’t want anything to do with new technology and do not willingly adopt technological products (pp. 12-14).

An important part of staff development in technology requires a look at what has been done in the past. How often did inservice training sessions occur? Were teachers required to sit through training after teaching all day? Did the topics emerge from real needs of teachers or perceived needs from central office administrators? What was done

in the past needs to be revisited in order to accomplish meaningful staff development programs (Shelly, 2000).

Summary

The role of the administrator as technology manager contains several behaviors and skills as reported in the literature. Making curricular decisions, allowing teachers to learn new programs, and creating staff development programs are behaviors a technology manager would need to demonstrate to advance technology in the school. Using voice mail, electronic calendars, and district email are skills administrators could use in the day-to-day management of schools. There was no evidence that attitudes related to technology manager have been researched.

The Administrator as Technology Politician

When wearing what Kearsley (1990) described as a *politician's hat*, school administrators facilitated the establishment and implementation of policies and procedures that assured that computer-related technologies would serve the needs of all stakeholders (i.e., parents, PTA). Administrators play a critical role in technology policy issues related to planning and decision-making.

Key Writers

All of the key writers addressed issues of technology policy and the policy role of the administrator. Lumley and Bailey (1993) focused on policy issues in *Planning for Technology: A Guidebook for School Administrators*, organized around a six-step model for technology planning. They described the following steps in developing effective technology plans:

1. Organizing and empowering a district technology planning team.
2. Preparing the planning team for the study.
3. Assessing the current state of technology in the district.
4. Developing guiding documents for technology.
5. Developing a long-range technology plan.
6. Implementing, institutionalizing, revising, and evaluating the technology plan.

Bozeman and Spuck (1991) advocated infusing computer content into appropriate educational administration courses so that administrators could become better prepared to make informed decisions. They suggested, for instance, that creating and manipulating spreadsheets should be embedded into financial courses, while database intricacies could be an integral part of a curriculum development course. They argued that this infusion model was not only more effective than separate technology courses but also powerfully modeled for administrators on how teachers should be integrating technology into the school curriculum.

Kearsley's *Computers for Educational Administrators: Leadership in the Information Age* (1990) was intended as a text for a graduate school administration course and concentrates on policy issues. Topics included (a) planning for computers (e.g., identifying goals and objectives), (b) acquiring hardware/software (e.g., implementation schedule, evaluation, and establishing policies), (c) successful computer implementation (e.g., facilities, staffing, training, security, and maintenance), and (d) financing computers (e.g., cost/benefits analysis, budgeting, funding sources, and computer expenses).

Thomas and Knezek (1991) identified a number of required policy-related competencies for principals: (a) personnel management, (b) facilities planning, and (c) financial planning. Policy-related competencies identified for computer coordinators (e.g., application of research funding, planning computer implementation, supporting instruction with technology, and knowledge of emerging technologies) might apply to some principals in smaller schools.

Decision Making Concerning Technology

Shared decision-making was a frequently mentioned model concerning technology decision-making for administrators, teachers, computer coordinators, and community members (Bailey, 1997; Becker, 1993; Dede, 1994; McKenzie, 1993; Ricketts, 1990; Rockman & Sloan, 1993). Ricketts (1990) found that 40% of school districts had active computer advisory committees and that 60% had a long-range plan for technology in the schools. Becker (1994) found that neither decentralized, autonomous teacher-level nor school-level decisions regarding technology were associated with effective integration of computers. Rather, the study showed that “knowledgeable district administrators and school-based computer coordinators must be called upon to lead and make decisions regarding school computer-use efforts” (p. 28). In spite of the recent trend toward greater empowering of individual teachers as decision-makers, Becker felt that

...reliance on district and school-based computer experts can coexist with decentralized site-based management and increased teacher authority. . .[because] there are just too many things to learn about using computers effectively and creatively for schools to succeed in using computers without active involvement

of district-level experts and without investing in an on-site, full-time curriculum development and staff development computer coordinator (p. 28).

Summary

The role of the administrator as technology politician includes many skills. One of the key themes in this role was that of strengthening educational leadership programs. Creating and manipulating spreadsheets and databases are just two of the skills that could be taught. Additional technology politician skills would be acquiring hardware/software and planning for computers. Shared decision-making and the establishment and implementation of policies and procedures are technology politician behaviors reported in the literature. There was no evidence that attitudes relating to the technology politician role have been researched.

Chapter Summary

Kearsley's (1990) three-point model of administrative roles in terms of technology leader, technology manager, and technology politician effectively suggests the scope of attitudes, behaviors, and skills needed by administrators who wish to help their schools and teachers make effective use of existing as well as emerging instructional technologies. As technology leaders, school administrators need to be aware of the roles they play in helping to establish the school's vision for technology. As technology managers, they need to know how best to use technology not only in the day-to-day management of the school but also how to assist teachers in implementing curriculum integration and changes in instructional approaches. Finally, as technology politicians, they play a critical role in technology policy issues related to planning and decision-making.

In this chapter the related literature pertinent to this study was reviewed. There is no single comprehensive in-depth study performed during recent years to indicate, in any great detail, the attitudes, behaviors, and skills of a junior high school principal in a technology-enriched school. Although there are no clear and concise answers to the research questions, the identification and analysis of successful attitudes, behaviors, and skills used by a junior high school principal will prove beneficial to understanding the challenges of the building administrator.

The present study is an attempt to expand the body of knowledge relating to technology leadership with the anticipation that this knowledge may be used to identify and strengthen skills that will assist administrators in supporting their teachers in using and integrating computer and related instructional technology into the curriculum. This knowledge may also be used to assist school districts in the selection and future training of prospective administrators.

CHAPTER 3

METHOD

Introduction

In this chapter the research questions are stated as well as the method to address them. Included are (a) a description of the research design and procedures, (b) data collection activities, and (c) data analysis.

Restatement of the Problem

This study sought to identify and describe the technology-related attitudes, behaviors, and skills used by a junior high school principal in a technology-enriched school.

Specifically, this study was guided by the following research questions:

1. What are the instructional technology-related attitudes, behaviors, and skills of a junior high school principal who serves as a leader in a school with a technology-enriched program?
2. What role does this principal play regarding instructional technology in the school?

Research Design and Procedures

This section will address (a) the rationale, (b) site criteria, (c) the setting, (d) gaining access, and (e) the participants. A qualitative perspective was determined to be

the best method for addressing the research questions. Merriam's (1998) five characteristics of qualitative research studies were useful in determining the appropriateness of the qualitative method for this study:

1. The researcher is interested in understanding the meaning people have constructed.
2. The researcher is the primary instrument for data collection and analysis.
3. Research activities usually include fieldwork.
4. The researcher primarily employs an inductive research strategy.
5. The product of a qualitative study is richly descriptive. (p. 6-8)

This study included each of the above characteristics. For example, the researcher was the key instrument in collecting and analyzing data. In addition, the researcher observed behavior in its natural setting; a technology-enriched junior high school. In terms of being inductive, this study built concepts, themes, and categories rather than theory.

The case study is a favored method of qualitative research when the study focuses on an organization (Yin, 1994), which this study does. A case study is defined as "... an empirical inquiry that investigates a contemporary phenomenon within its real-life context, especially when the boundaries between phenomenon and context are not clearly evident" (Yin, 1994, p. 13). Since the variables of this phenomenon were unable to be separated from their context, a case study design was considered appropriate (Yin, 1994).

According to Merriam (1998), the case study can be defined further by its special features. This case study was characterized as being particularistic. This study focused on

a particular situation at a particular school. There are three criteria that reflect a particularistic nature (Merriam, 1998).

1. It can suggest to the reader what to do or what not to do in a similar situation.
2. It can examine a specific instance but illuminate a general problem.
3. It may or may not be influenced by the researcher's bias.

Site Criteria

Criteria for the school site were determined by drawing on the literature. Because the study's research questions could only be explored in the context of a technology-using school, the school had to have an established technology program. The selected school, Ada Junior High School had an established technology program. Ada Junior High School had computers for teacher and student use. Adequate resources, which are closely tied to budgetary concerns, have been found to be the most serious obstacle keeping teachers from obtaining what they see as essential technology (Becker, 1994; Kearsley & Lynch, 1992).

In addition, the Nevada Computer and Technology Education Standards (Nevada State Department of Education, 2000) was used to determine whether Ada Junior High School was a technology exemplary school. The guidelines contain three levels: (a) Level I (low tech), (b) Level II (mid tech), and (c) Level III (high tech). Each level was further divided into five sections (i.e., what students and teachers can do, networking, infrastructure, hardware and software, and evaluation). Ada Junior High School achieved Level III on all but one of the 32 guidelines. Some of the achieved guidelines included: (a) all classrooms are networked and have Web/Internet access, (b) classrooms have access to worldwide library and media learning resources, (c) computers have sufficient

memory and processor speed to run multimedia applications, and (d) students and teachers have access to email, and district learning resources. The school does not have at least a ratio of five students to each computer. That is a goal that has not yet been met since the ratio is eight students per computer.

The principal at the school should have been at the school long enough to have established a "track record" for technology leadership, which requires time to develop and implement (Ely, 1995; Rockman & Sloan, 1993). The principal at the selected site had been at the school for two years. The school itself should have people involved who demonstrate technology leadership. Kearsley and Lynch (1992) state that technology leadership roles may be performed by administrators, teachers, staff, parents, and even students as well as committees, support groups, teams, and associations. A cadre of teachers, the computer specialist, the media specialist, and the learning specialist demonstrated technology leadership at Ada Junior High School.

Teachers and students in a school site that was effectively using instructional technologies had to make efforts to integrate technology into the curriculum (Becker, 1994; Ely, 1995). Teachers at Ada Junior High School integrated computers into the curriculum. Lastly, the selected school site should have a full-time technology professional in the school. Ada Junior High School had a full-time computer specialist. Becker (1992) found having a full-time school technology coordinator was one of the characteristics of effective schools. The technology professional had responsibilities for the school's instructional technology program.

Setting

Ada Junior High School in southern Nevada is located in a large metropolitan city. The school district was the ninth largest in the nation. The school, one of 37 junior high schools in the district served approximately 2,100 students in grades 6-8.

Located in the northwest part of the city, the one-level facility for Ada Junior High School was built in 1998. The school was beautifully well kept, with carpeted hallways and teacher decorated walls. Large planters, made of brick, were displayed in front of the school, common areas, and classroom pods. The school office included not only the principal's office but also a conference room, offices for the two assistant principals, the two deans, the registrar, counselors, the banker, the nurse's office, copy machines, mail boxes, and work space for clerical staff. The walls of the office area and electives pod were filled with artwork donated to Ada Junior High School by its namesake. Portable classrooms were located in front and back of the school due to overcrowded conditions. One of the portables housed the administrative offices of a new junior high school that was being built approximately one mile from Ada Junior High School. It is due to open early 2002. The parking lot in the back of the building loaded and unloaded onto buses almost 25% of the school's students.

During the 2000-2001 school year, Ada Junior High School enrolled 2,149 students from the sixth through eighth grade and had 90 classroom teachers and three specialists (e.g., library, computer, and learning) at the school full-time. Teachers were divided by grade level as well as by hallway. All students moved after each fifty-minute period to other classrooms. Most teachers planned together, using interdisciplinary

approaches in many curricular units. Teacher preparation time was provided daily for fifty minutes unless a teacher sold their preparation period to teach an additional hour.

The principal was assigned to Ada Junior High School in the fall of 1999 after completing a leave of absence due to a family emergency. At Ada Junior High School he was one of five administrators, with responsibilities ranging from long-range curriculum implementation and teacher evaluation to day-to-day concerns for the building such as water leaks and morning announcements.

Gaining Access

Permission for conducting the study was secured prior to site entry into the school. The process of approval entailed submitting an application for research to the local school district, detailing the purpose of the study, rationale for the study, and a brief description of the research design. Once the researcher received permission from the district to conduct the study, the researcher then contacted the school principal (see Appendix A). Once the principal agreed to allow entry into the school, the researcher contacted the participants to begin the study.

Participants

To get a complete understanding of technology-related attitudes, behaviors, and skills, it is important to gather information from teachers with different degrees of use. Miles and Huberman (1994) note that it is “important to work a bit at the peripheries – to talk with people who are not central to the phenomenon but are neighbors to it, to people no longer actively involved, to dissidents and renegades and eccentrics” (p. 34). A reputational-case selection method was used for selection of participants. In other words, the researcher chose instances of a study population on the recommendation of experts

(LeCompte & Preissle, 1993). Kim, the learning specialist, and Mary, the media specialist, along with William, the computer specialist, were asked to identify teachers who represented a cross-section of technology use ranging from high-use to low-use. Those persons selected through the process were asked to participate in individual interviews. These staff members helped the faculty develop lesson plans to benefit students in the classroom. In that role these staff members visited classrooms and were aware of what computer tools are used and to what extent.

Participants were selected so as to ensure inclusion of persons with characteristics that were important in the context of the study. To maximize the possibility of looking at a wide spectrum of experiences, both low-end users and high-end users were sought. A low-end user is a person who makes limited use of emerging technologies or technology-based learning activities. A high-end user is a person on the leading edge of technology, knows much about emerging technologies, and usually experiments with technology-based learning activities (Bailey & Lumley, 1994).

Six participants were included in this study. The participants were based on four categories: (a) principal, (b) computer specialist, (c) two high-end computer users, and (d) two low-end computer users. This arrangement provided the opportunity to compare and contrast the perceptions of different organizational levels and to also keep the number of participants to a manageable level. They were given pseudonyms to guard anonymity.

The sample for the survey included four teachers; Paige and Holly (two low-end computer users), and Zach and Lisa (two high-end computer users). In addition Leroy, the school's principal and William, the school's computer specialist participated.

Participation in this case study was voluntary. The participants and the researcher signed consent forms (see Appendix E). The forms were required for university-based research, but also essential for clarity, prevention of misunderstandings, and simple courtesy. A copy was given to each participant and originals were stored.

The participants' teaching experience ranged from 5 to 17 years. Among the interview participants, only one did not have an advanced degree. All had a home computer with access to the Internet and WWW. William helped write the school's technology plan.

Data Collection

Triangulation

Effective qualitative research uses data collected from a multitude of sources using multiple methods (Merriam, 1998; Miles & Huberman, 1994; Yin, 1994). This is particularly true of case studies like this one, where the researcher has to decide which activities, processes, events, times, and location to sample. Data were gathered through (a) a written questionnaire, (b) semi-structured interviews, (c) relevant documents (i.e., minutes of meetings, lesson plans, scheduling logs, staff development plans, school budgets, memorandums, and technology plan), and (d) researcher observations. The collection of multiple sources of data increased the possibility of triangulation. Merriam (1988) described triangulation as "using multiple sources of data, or multiple methods to confirm the emerging data" (p. 169).

Instrumentation

This study utilized multiple data gathering instruments to enhance internal validity of the findings. Specific instruments included a questionnaire and three interview guides to collect data from the respondents.

Questionnaire

The participants were asked to complete a questionnaire specifically designed to answer how they use technology and their hopes for technology at the school. The researcher designed the questionnaire (see Appendix D). A researcher with expertise in questionnaire development reviewed the questionnaire and tested it for item clarity. Two junior high school computer specialists reviewed the questionnaire. Changes in wording were recommended and incorporated.

Interviews

To determine the present perspective, semi-structured interviews were conducted with the identified staff of Ada Junior High School. A semi-structured interview begins with structured questions, and followed up by more open-ended questions designed to probe more deeply. The semi-structured interview is generally most appropriate for interview studies in education (Borg & Gall, 1986).

The interviews, which were conducted on site, in a room mutually agreeable to participant and interviewer, were the heart of the data collection in this study. All interviews were conducted on site after school hours so as not to interfere with contracted work time. Interviews were spaced at least two days apart to allow time for reflection. In addition, the respondents did not feel rushed and gave the researcher their undivided

attention to the interview. A question base was used to guide the conversation but open-ended questions allowed respondents to reply individually.

The interview guides were developed in a three-step process (e.g., planning, reviewing, and testing). First, during the planning stage, numerous research articles on technology leadership, uses of computers, and curriculum integration as well as leadership in general were reviewed. Survey instruments, especially interviews to gather information about computers in education were studied. Interview guides were constructed based on information derived from the literature review.

In step two, after construction of the first draft, the interview guides were submitted to two higher education faculty members for review and suggestions. The reviewers provided valuable criticism and many constructive suggestions for improvement. A final draft of the interview guides was developed after repeated revisions.

Step three was a pilot test. The interview guides were sent to several junior high school teachers and administrators who agreed to respond and comment on any problems they encountered, such as unclear wording and terminology. They offered suggestions for improvement both in form and in content. Their suggestions, comments, and criticisms were incorporated into the final version of the interview guides.

Interview participants signed consent forms (see Appendix E) that state their responses will be kept confidential and anonymous, and that the written report will not reveal their individual identity. Biographical information about the interview participants was also collected (see Appendix D).

Leroy was interviewed twice during the course of the study. The first interview concentrated on the principal's attitude about educational technology related to technology use in the school (see Appendix B). A follow-up interview was conducted focusing on behaviors concerning educational technology (see Appendix B). The timing of the two interviews allowed for triangulation of data by comparing information collected from other informants. Both interviews lasted one and half-hours, with anticipated brief, spontaneous, informal interviews occurring during the course of the study.

Technology Profile

A number of surveys have shown that the access teachers and students have to instructional technology is an important aspect of an integrated technology program (Becker, 1991; Becker, 1994; Siegel, 1995). The Technology Profile (see Appendix C) was designed to discover information about the technology used in the school (e.g., numbers and types of computers, computer network, emerging technologies, telecommunications, types of software, location of computers).

Organizational Profile

The Organizational Profile (see Appendix C) was designed to gather additional information. These factors included site demographics (e.g., numbers of teachers, average years experience of teachers), school governance structure (e.g., shared decision-making model, multi-age classes, flexible scheduling) (Davis & Henry, 1993; Sheingold & Hadley, 1990), longevity of school's technology (Beaver, 1987), and participation in technology-related decisions (Hurst, 1994; Mowe, 1993).

Data Analysis

Miles and Huberman (1994) were followed for details of data analysis, data display, and conclusions drawing and verification. Coding, sorting, and pattern matching were used in analyzing the qualitative data collected. Sharing field notes from the participants, observations, and discussions with other people knowledgeable about technology and schools was an important part of the researcher's data analysis strategy. These knowledgeable people included two faculty members in higher education. One individual was an associate professor at a major midwestern university who taught and advised doctoral students. The other individual earned a doctorate in instructional technology and was working in library services at a community college.

Data Analysis Procedures

Text from the interviews, questionnaires, and observational data first were coded into categories reflecting the research questions: (a) personal skills, (b) reasons for use, (c) technology use, (d) school climate, (e) support for technology, (f) planning, (g) impact of technology, (h) resources, (i) impact on instruction, (j) budget, and (k) advice to others. In the beginning, repeated readings and highlighting of printed copies of data was used.

Notes were made during the individual interviews and during observations at the school site. Transcripts of interviews and observations were input into a qualitative software program N5 (2000) and a file was established for each key informant. To provide for confidentiality, a data filing system was developed, and files were maintained in a file cabinet. Data collected were placed in an alphabetically coded file folder.

Data from the interviews were divided into individual chunks using N5 qualitative research software. The chunks ranged from one sentence to one paragraph in length. The data were coded, and then the qualitative software was used to extract data to be placed in new categories. This procedure helped the researcher to review, revise, and refine categories of data and codes.

However, N5 was not used in the final phase of data analysis. N5 required the researcher to spend a great deal of time learning how to use the software before the data could be analyzed. Therefore, the traditional method of analyzing the data on paper was used instead of using the software program.

A contact summary form (see Appendix E) was completed following each interview session to record key points of the contact and to identify possible themes (Miles and Huberman, 1994). Qualitative data obtained from the interviews were analyzed and summarized for themes and patterns (see Appendix F). Through multiple readings, the text for each research question was color-coded according to emerging themes and patterns for each participant.

The inductive, constant comparative approach (Merriam, 1998) was employed in this study to generate meaning from the data, and to confirm the findings. The process for data analysis was continuous and ongoing. Following each interview session, responses were compared to previous interview responses. This constant comparison method lead to many more categories until a theme could be formulated.

Notes, memos, and documents were analyzed, marked according to each question, and used to confirm, enhance or contradict interview data. Throughout the analysis, the

researcher was the primary instrument of analysis (Bogdan & Biklen, 1992; Patton, 1990; Wolcott, 1990).

Dependability

Data were organized and coded in N5 so that all reported information could be traced to the source of the data. During the study, classroom observations and interactions were made on a regular basis. The participants were neither threatened nor confused by the researcher's dual roles. Therefore, there was reason to have confidence in the accuracy of their responses.

Chapter Summary

This qualitative case study is designed not only to build on but also to expand the literature related to technology leadership and the role of administrative support of technology in schools. Technology leadership in a southern Nevada junior high school was investigated, with particular attention given to the technology-related role(s) of the principal. The school site was selected on the basis of the following criteria: (a) an established technology program, (b) an experienced principal, (c) adequate technology to support students and teachers, (d) technology integrated into the curriculum, and (e) a full-time school technology professional.

Evidence was gathered from a variety of sources, including: (a) a technology profile, (b) an organizational profile, (c) in-depth interviews (principal, school computer specialist, and technology-using and non-using teachers), (d) document analysis, and (e) observation. Although data was triangulated, coded, and analyzed with the assistance of N5 qualitative research software, the researcher was the primary instrument of analysis in this qualitative study.

CHAPTER 4

CASE STUDY: ADA JUNIOR HIGH SCHOOL

Background

This chapter is separated from the main results section which appears in chapter five. This chapter begins by describing the Ada Junior High School interview participants. Next, the U.S. Congress Office of Technology Assessment's model for effective use of technology published in *Teachers and Technology: Making the Connection* (1995), provides a framework to detail the technology context at Ada Junior High School and the roles that the school principal plays in the technology picture. The chapter concludes with a description of the technology leadership in the school.

Study Interview Participants

Leroy, the principal, was interviewed twice during the course of the study. In addition, five additional staff members selected to represent a cross-section of technology use agreed to participate in semi-structured, hour-long interviews. These participants were selected based on recommendations from Mary, the school's media specialist, and Kim, the school's learning strategist. As shown in Table 1, high-end and low-end use teachers and the computer specialist were represented. Numerous attempts were made to interview separately other teachers on staff, but these teachers rescheduled and broke appointments and thus were not part of the interview process.

Table 1
Interview Participants' Technology Training

Names	Position	Self-Taught	Self-Rank (10 high)	Training Received from These Sources			
				School	Conf	Peers	Students
Holly	teacher	x	7	x	x	x	x
	low-end						
Leroy	principal	x	7	x		x	x
Lisa	teacher	x	9	x		x	x
	high-end						
Paige	teacher	x	7	x		x	x
	low-end						
Will	computer specialist	x	8	x	x	x	x
Zach	teacher	x	10	x	x	x	x
	high-end						

The participants' teaching experience ranged from 5 to 17 years. Among the interview participants, only one teacher had not yet earned any graduate college credits. All had a home computer with access to the Internet and WWW.

Participants' self-ranking of their personal technology skills tended to corroborate the descriptions given by the learning strategist and media specialist. One exception was Zach, who claimed he could but didn't rank himself as a "three or maybe a four because there's so much I don't know about technology" and contrasted his technology use to that of the computer specialist. Observations of Zach's students in both his classroom and the IBM lab confirmed a high-use technology environment that corroborated the description of the learning strategist and media specialist as a high end user. Students used Zach's classroom computer to do word processing using ClarisWorks. These seventh graders used ClarisWorks to draft, revise, edit, spellcheck and print various assignments. Technology was woven into most of the learning activities in Zach's classroom and showed that Zach qualified as a high-end user.

Paige, on the other hand ranked herself as a seven while she had been described by the learning strategist and media specialist as a teacher who "didn't use technology much." Observation of her sixth graders showed, however, that she successfully integrated technology in many ways. Her computer was on from the moment she walked into her classroom. "In fact," she said, "it is so integrated into my day that if it goes down I am usually one of the first people to be aware of it."

Paige admitted that she didn't take her students to the computer lab and her reason for this was revealing. She preferred to sometimes have students working in small groups at different levels and on different projects, an approach that she says is encouraged by

the school. Going to the computer lab meant taking all the students, whether they were at a point of needing to use the computer for their learning or not, because she was required to accompany the students. Paige preferred to have the computer available to students when they needed it and when it was integrated into their work; for example, one group was finishing using her computer and the networked hallway printer to print off final copies of letters they had written, while another group would be ready to print their latest book review.

Effective Use of Technology at Ada Junior High School

According to *Teachers and Technology: Making the Connection*, published by the U.S. Congress Office of Technology Assessment (OTA) (1995), a combination of eight factors contribute to the success of a school's technology program. The eight factors are as follows: (a) technology suited to education goals, (b) vision of curricular applications, (c) access to technology, (d) inservice training, (e) technical support, (f) time, (g) preservice training, and (h) administrative support. The school administrator's relationship to these eight factors serves as a framework for discussing the technology context at Ada Junior High School.

Technology suited to education goals. The staff at Ada Junior High School was moving beyond the popular drill and practice programs to more simulation software and computer applications such as databases and word processing. During this time period the school district was instrumental in shaping a vision of curricular integration. This was to be accomplished partly by assigning a computer specialist to every secondary school. William helped plan the four IBM labs. Extra computers were placed in classrooms so those students would have immediate access to basic computer programs ranging from

ClarisWorks to drill and practice software. Each classroom ended up with at least one computer on carts. Some classrooms requested to have more than one computer.

Leroy was assigned to Ada Junior High School after completing a year's leave of absence. He was not asked specifically about his commitment to or philosophy regarding technology. But when he arrived at the school in the fall of 1999, he worked to be sure that the technology component became a part of the course rotation for sixth and seventh graders. He has not wavered from this belief in the integration of technology:

My expectation still is that the classroom teachers teach the technology and use the technology with their students. Classroom teachers have the main responsibility for learning the technology available in the labs and then using it for and with students.

Leroy viewed the labs, then, as a space for teachers "to do things that will help them in their classroom. Technology needs to be seen as a tool to help the teachers and students learn."

Visions of curricular applications. Leroy was convinced that the classroom teacher should be the primary technology teacher, saying that he "pushed the teachers to really embed technology into the curriculum":

I feel strongly that the classroom teachers are the individuals who need to be teaching technology to the students. We have people to help teachers because they can't do it alone. We have a computer specialist in the computer lab, we have the media specialist, and we have all kinds of materials. I just feel that the teachers need to make the technology a part of the curriculum, to tie it into what they're doing in the classroom.

When asked about the impact technology is having on teaching, he said

I still see a few of us using computers quite a bit for games, as rewards, as enrichment, as “extras.” That’s okay, but it needs to be more than that. I would personally like to see more life brought into the classroom through some of the multimedia programs to make learning more relevant to students.

Teachers at Ada Junior High School were aware of Leroy’s commitment to technology integration (Holly noted that “Leroy’s stand on this forces all teachers into learning themselves. Maybe *forces* is too strong a word, but it sure encourages them.”) Lisa believed that some teachers in the building are “really making strides at building technology into their teaching methods and content areas.”

A strong example of technology curricular integration came from Lisa who conducted a stock market simulation project for her eighth graders. The project, which extended over a few months, involved research using both traditional and electronic sources (e.g., library catalog, an online periodical index, a CD-ROM encyclopedia, and WWW searches using a search engine). At various stages, students used computers to word-process letters to various companies, research plans, and text for poster displays. Lisa felt that the project helped her students become more independent learners, though some students struggled with this change in roles:

The project for some of them was really difficult because they wanted me to give them the answers. They didn’t want to work for it. They had to learn not to give up, to continue trying when they reached something that blocked their way. They had to think of another question that would help them continue learning.

Mary, the school's media specialist for the last two years, described the growth of the media program from a traditional library skills course to a combination of research skills and technology, including CD-ROMs, Internet searching, videodiscs, and e-mail. Due to her role that included overseeing the library, she commented that her schedule "doesn't leave me enough time to talk to teachers, to plan with them, to try to work on skills in media that will tie in with what they're doing in class."

Teachers at Ada Junior High School found their role was changing when they taught more with technology, as Holly described:

When I first started to teach, it all came from me. You know, the teacher knew everything and told the kids. We've come a long way from there. Now it's more like I'm a facilitator, helping them find out what they want to know.

All of the classroom teachers pointed out the facilitator role of their teaching. Lisa mentioned how well cooperative groups and technology "fit together." With only one computer available in her classroom, students must collaborate in using the technology. Zach noted that the students' role changes also: "frequently, students become mentors for other students, teaching them how to use a computer program, how to spellcheck a letter, how to select material in a database and paste it into a report."

All of the teacher interview participants identified curriculum integration as one of the biggest technology-related challenges still facing the school. This issue was closely tied to having adequate time to learn and plan. The Learning Improvement Team (LIT) was working on a technology skills implementation plan, which Lisa and Holly believed would be helpful to all teachers.

Access to technology. Since the fall of 1998, every teacher and specialist at the school has had an IBM computer in his/her room. These computers were hooked to the district network in 1998. Many teachers allowed students to use the classroom computers to complete assignments for their classes. These teachers tended to talk about "our computer" rather than "my computer," thus sharing ownership and access with the class. Selected CD-ROMs (including a multimedia encyclopedia) could also be accessed through the teacher computers. Because of the need for using the computer for research and communication needs, additional computers with CD-ROM drives were placed in all the portable classrooms in fall, 2000. That plan was modified due to a theft of two computers. As a result, laptops were purchased for those portable classroom teachers to check out for their use.

Teachers signed up to use the computer lab and had to accompany their classes, a policy that meshed with Leroy's philosophy regarding the classroom teacher as the technology teacher. With an advance request, the computer specialist could be available to help set up software, turn machines on, put software away, and help with student questions.

A class of special education students, on a visit to the lab, were able to load a disk, close the disk drive door, manipulate some keys (e.g., arrow, spacebar, and return), and put the disk back in storage. One student commented proudly, "We have a computer at home. I can do this by myself." The special education teacher, who came to the lab at least twice a week, was delighted that his students could all read the screen directions for a phonics drill program: "We are so lucky to have a lab like this. I know other schools that don't have nearly as much technology as we do."

The IBM lab was designed to comfortably hold an entire class at one time. The computers were arranged on laminated tables around the periphery of the room. An instructor computer was hooked to a liquid crystal display to project the computer screen, a feature that William used when demonstrating new software concepts. He said he tried to balance different technology skills in his presentations.

William commented that there was one major drawback to the lab. When the network goes down, students couldn't print. Classrooms, which share a laser printer, were similarly unable to print at times, slowing down many aspects of the research and writing process.

Because the lab was used a large part of each day, it was not always available for teacher use for convenient, "just in time" access. Teachers had to accompany their classes to the lab. This policy was worked out collaboratively with William and Leroy, who wanted to prevent the lab from becoming a "drop off spot." While the policy may have prevented this for the few low-end use teachers in the school, some of the teachers more committed to both technology and cooperative work expressed frustration at not being able to access the lab with only a portion of their students. Paige, Holly, and Lisa all referred to the problem of "just in time" access to computer technology as one of the biggest problems in integrating technology into the curriculum.

Inservice training. The Ada Junior High School technology staff development program had both formal and informal aspects. With the help of the technology committee and support of the principal, William designed a series of staff development technology courses. William also taught a computer class for teachers that granted credit for advancement on the salary scale. The classes were well attended by the staff. As

William said, "We can teach this ourselves." The classes were designed as "hands on" experiences to meet the teacher's needs. Teacher interview participants all indicated an interest in training opportunities that emphasized integrating technology, something they felt the district wasn't doing enough to help them with.

Informal technology training occurred on an on-going basis. Each grade level seemed to have a "local guru," as Paige said, that teachers turned to for technology advice and assistance. Mary and William offered mini-workshops during teacher's preparation periods on using CD-ROMs, a grading program, and other new products. Even though the students were using CD-ROMs in the computer lab, only a few classroom teachers attended the mini-workshops, some telling William that "we are not ready for that right now." William hoped that more training for teachers could become available.

William pointed out one weakness in the informal training system: "The first thing people do when they have a problem is to call me. They depend on me too much." He wanted to see more people in the district step forward to be technology sources for teachers.

Leroy had a strong commitment to the technology training program, noting "the important thing with the technology was the commitment to training staff." He has attended many courses in the past, and plans to take a multi-media course in the near future, consciously choosing to model behavior for his staff: "I think if I expect my teachers to know how to use it, then I have to know how to use it, too, so I can be a more effective resource person for the teachers." He enjoyed learning and participating in the

training alongside his teachers and felt it made him “more responsive to their problems and challenges.”

Technical support. When asked about technology-related problems the district had not yet solved, each of the classroom teachers brought up the critical need for more technical support, particularly stressing a full-time technician who can help ease the burden on William. One teacher who recognized this need said, “We need more technical help. When things go down, like the network crashes, we don’t have enough people who can fix things. William is great, but he is too busy. I worry about him.” William, in fact, worried about himself:

I think the administration has no idea how thoroughly frustrated I am. For example, they just asked me to run a workshop for new teachers at the end of August. So now I have that to prepare all by myself. The decision has already been made, so I probably won’t be able to bring anyone else in to help me, get things ready, that sort of thing. The idea sounds good, but they just don’t think things through before acting. Teachers tend to know how overworked I am, even if they don’t have much of a clue as to what I do.

William estimated that he could easily spend 90% of his school-day time helping teachers learn and use the available technology. William thought that the school was “not especially pushing anyone to take this instructional leadership over – ‘Don’t worry, let William do it,’ seems to be their attitude.”

William’s strongest support came from an informal network of fellow computer specialists from schools within the school district. They gathered together once a month to share problems, brainstorm solutions, and learn from each other and were also in

frequent e-mail communication with each other. William said that “most of them are as frazzled as I am. Schools are just not planning for this kind of support that all this technology requires.” One of these computer specialists suggested that William try to get a student-aide to help with some of his tasks. The student aide could help cleaning computers, organizing software, and typing small tasks.

Leroy was supportive of increasing technical and teacher support at the secondary school level. The learning specialist and media specialist approached Leroy about needing more assistance in the computer lab, especially since both could not often break away to help with any problems. Working with the counselors, student aides were trained and assigned to help with basic troubleshooting in the labs, loaded software on lab and teacher computers, and often helped with student questions when classes were in the labs.

Time. Lisa’s description of time seemed to capture the challenge of teachers at Ada Junior High School:

We need time to learn, time to plan, time to play, time in class, and time to change how we teach. We just need more time. And we need to learn to use time management when we’re teaching with technology.

Leroy was also in the process of creating a resource room in an unused conference room, pulling together a variety of resources, including video tapes he had ordered about cooperative learning, teacher periodicals, sample units, software guides, and other items to which he would like teachers to have easy, quick access. While the room would not be devoted totally to technology, Leroy saw technology as an important component of the teaching resource room space, which would have an Internet connection. He would like

to see teachers using the conference space in this room to take time to discuss and plan curriculum collaboratively.

Another way Leroy supported teachers' time was to provide release time for technology leaders to attend workshops and conferences. Leroy encouraged teachers as well as students to learn the capabilities of a software program by taking time to experiment with it: "Just pull down all the menus and see what's there. Try everything."

Preservice training. "Any student teacher at Ada Junior High School would get a healthy exposure to using technology," William said, "particularly because technology is used by many teachers." A geography student teacher, for example, helped to develop a database of European countries, which was used by the entire department.

As part of the school's set of interview questions for prospective teachers, candidates were interviewed about technology. "Share with us your experiences with technology and some of the applications you have used" was the base question used to probe candidates' knowledge of and attitude toward technology. Leroy cautioned that "inexperience would not disqualify them from being hired, nor would a lot of experience get them hired." While technology was one of many things evaluated in a potential teacher, he admitted that "strong technology experience and interest would just nudge you a little closer to being the candidate to hire."

Holly, the interview participant with the least teaching experience, remembered that during her teaching interview she was asked about her skills in technology, though she said that "they just took my word for it, they didn't ask me to do what I said I could do."

Interview participants were asked what advice they would give a new teacher about technology. All mentioned collaborating on a technology-related project with others such as the media specialist, or the technology teacher. Zach said he would urge a new teacher to “hook up with a mentor and learn from that person.”

Administrative support. Each of the interview participants agreed that administrative support was important for them in using technology effectively. Responses for the following question are categorized and included in Table 2: “Surveys of teachers have found that they need administrative support to successfully use technology. Describe how your principal supports instructional technology in this school.” Teacher responses paralleled the facets of effective technology use identified by the U.S. Congress Office of Technology Assessment (OTA) (1995) and used as the framework for this discussion. The related pairs are as follows: access to technology (providing financial resources and providing appropriate facilities and space); vision of curricular applications (promoting a vision and positive attitude to technology); time (providing time to deal with technology); technical support and inservice training (providing time to deal with technology and providing resources and opportunities for training). This overlap confirmed that the principal played a role in supporting technology within Ada Junior High School.

Table 2

Principal's Support of Technology

providing financial resources, especially for hardware and software

I think Leroy is good at fighting for our fair share. (William)

Our principal is very supportive of any type of technological advancement. (Zach)

The administrators need to see that the technology we have really works, that it doesn't break down so often. (Paige)

providing appropriate facilities and space

To me it would be to purchase computers and give space, computer space. Be willing to give up rooms so there's computer space. (Zach)

promoting a vision and positive attitude to technology

I think Leroy's role is to let teachers experiment with technology. (Zach)

Leroy is updated with technology. He knows where it is going. (Zach)

Administrators need to see the possibilities of technology, to keep us interested. (Holly)

providing time to deal with technology

One thing I need is time. I don't have time to work with other computer specialists, to learn from them. (William)

Somehow we need to find more time in the schedule. I think Leroy can help us here. (Holly)

providing adequate technical support

Administrators need to be willing to hire the help we need to make technology work, even if it means changing some priorities and past practices. (William)

(table continues)

Table 2 (continued)

We need to hire more help. Both technical help and someone to help us with technology. (Zach)
providing resources / opportunities for training
I like to see an administrator who attends training sessions with the rest of us – it shows they really care about the fact that we're learning to use it. make the effort. (Holly)
maintaining open communication and collaborative decision-making processes
Administrators should make sensible, logical, informed decisions. (Holly)
Administrators should get input from people who are "in the know" about details before making decisions. (William)

Chapter Summary

Ada Junior High School, a 6-8 grade facility located in southern Nevada, had 2,137 students in the spring of 2000. Leroy had been the principal since 1999, returning from a leave of absence.

Intensive interviews with six staff members (the principal, the computer specialist, and four teachers) were conducted to investigate attitudes, behaviors, and skills of the principal as they relate to technology. The chapter described the principal's relationship to technology within the context of the school by examining its effective use of technology using an eight-point model developed by the U.S. Congress Office of Technology Assessment (1995): (a) technology suited to educational goals, (b) vision of curricular applications, (c) access to technology, (d), inservice training, (e) technical

support, (f) time, (g) preservice training (discussed here in terms of student teachers and new teachers), and (h) administrative support.

These facets were examined by comparing comments made by interview participants, researcher observations, and document analysis. Particular attention was paid to describing the meanings of “administrative support” in terms of technology and the roles (e.g., leader, manager, politician) that interview participants perceived Leroy played regarding technology at Ada Junior High School.

CHAPTER 5

RESULTS

This case study focused on the technology leadership at a junior high school in southern Nevada, with particular emphasis on the role of the principal. The two research questions for the study were as follows:

1. What are the instructional technology-related attitudes, behaviors, and skills of a junior high school principal who serves as a leader in a school with a technology-enriched program?
2. What role does this principal play regarding instructional technology in the school?

Research Question One

Interviews conducted with a variety of participants at the school were the primary source for data to answer the first research question. Conducted at the beginning of this study, the initial interview with the principal focused on personal computer use and philosophy. All other participants were then interviewed prior to a follow-up interview with the principal, allowing the participants' perceptions of the relationships of the principal and the school's technology to emerge naturally. Responses from the principal were then compared to responses from the participants as well as to information gathered

through document analysis in order to substantiate the technology-related attitudes, behaviors, and skills.

Technology-Related Attitudes

The study revealed a number of technology-related attitudes held by the school principal. The attitudes are identified by phrases taken from the principals' interview transcripts: (a) we're all in this together, (b) keep it positive, (c) give it a try, (d) you can do it, (e) learn from mistakes, (f) let's do what's best for kids, (g) it takes time, (h) let's be the front runners, and (i) there's always more to learn.

We're all in this together. One of the central attitudes identified in Leroy was his belief that as an administrator he wanted to be directly involved with the technology in his school. Sometimes he referred to the five-member technology committee, but most often it referred to the entire school. He demonstrated through his consistent participation in school and district staff development opportunities that it was important to him that he be able to use and apply the technology he expected his teachers to know and use.

Another manifestation of the *we're all in this together* attitude was his commitment to be an active and passionate user of technology. Word processing and computer-based researching were second nature to Leroy. Leroy used e-mail to communicate with a nucleus of principal friends, former colleagues, and others, whom he often asked for advice or assistance. He was comfortable using technology with students in both informal situations such as the media center and more formal classroom or computer lab settings.

Keep it positive. Leroy frequently used phrases like “it will be fun,” “we’ll have fun,” and “just play around with it,” when describing using technology, particularly with teachers who felt threatened by the complexities and changes of emerging technologies. His word choice in describing one-on-one coaching situations with low-use teachers was consistently positive and encouraging. One of his approaches to getting teachers familiar with a new software program was to urge them to “play around with it, pull down all the menus, try a little bit of everything to see what happens.”

Teachers at Ada Junior High School tended to mirror the word choice of their principal. Several of the teachers specifically worked to get students not to use the word *play* in association with the computer. In the media center or computer labs, William commented that “if students say, ‘Are we going to play on the computer today?’ I answer, ‘No, we’re going to *work* with the computers today.’” Lisa and Holly both said they corrected their students who said “play on the computer,” instead encouraging them to understand the computer as a productivity and research tool rather than a toy by using language such as “work with the computer” and “locate information using the computer.” The attitude at Ada Junior High School was decidedly positive and encouraging to both students and teachers.

Give it a try. Leroy consciously fostered a *give it a try* attitude in his teachers. For instance, Leroy encouraged Zach to try an Internet-based segment of a science unit with his seventh graders, and Leroy supported Holly by providing Web sites for a sixth-grade environmental unit. Lisa, an eighth grade teacher, commented that “I don’t think Leroy has ever said no to anything we wanted to try in technology.” Leroy himself said,

“If teachers want to try something, then I want to help make it easier for them to make that effort.”

You can do it. Leroy repeated this optimistic phrase so many times that some of the teachers at Ada Junior High School used identical wording to describe their own proficiency for using technology. The *you can do it* attitude was especially appreciated by those teachers who were less secure about using technology. Paige, an experienced sixth grade teacher who had been a virtual nonuser of technology before Leroy came to Ada, said that Leroy “let me know it’s okay, that I can do it.” Other teachers described Leroy as coming into their classrooms and sitting beside them while they learned how to use e-mail, encouraging them until they learned the skills needed to be comfortable.

Increased teacher empowerment was one result of this attitude that all teachers could master technology. Technology was not viewed as something that belonged only to a few elite teachers but rather as a tool to be mastered and then used by all in the school. Leroy mentioned significant technology-related ideas that had been generated by empowered teachers. The request for student aides for the computer labs came first from teachers to William, then from William to Leroy. The Ada Junior High School technology committee itself, of which Leroy was a member was an example of teacher empowerment through the *you can do it* attitude. Leroy encouraged the technology committee to approach the district with a proposal for the first completely teacher-presented, in-school staff development day.

Learn from mistakes. “I was so afraid I’d do something to break it,” Holly admitted, describing her classroom computer when it was first installed. “I’ve taught school for more than fifteen years, but it took me quite a while to realize that the

computer isn't as smart as I am. I had to make a lot of mistakes and have a lot of help to learn that." Leroy agreed with this description, noting that

it's almost a generational thing, this fear of technology, that they'll do something to break this expensive machine. It's hard for some teachers to be willing to make a mistake on a computer program and then to learn from it – you know, make a mistake on purpose when playing with some new software. They need to know what will happen when a student makes a mistake – which will happen, of course.

Leroy believed that giving teachers the opportunity to experiment with technology would give them the confidence to learn from the mistakes they made. He added that

Sometimes these teachers are especially afraid of making a mistake when students are around, so in order to avoid making a mistake they just avoid using technology with their students. Instead, they need to realize that they will learn from their students and from their mistakes, and that there's nothing wrong with that.

When they did use technology in their classrooms, teachers like Holly made use of knowledgeable students when they needed assistance.

Let's do what's best for kids. Leroy described Ada Junior High School as a "kids come first school, and this attitude was ingrained into many facets of the school, including technology. Decisions about technology were made with this belief in mind. For instance, for a staff meeting Leroy asked each teacher to use a Web search engine to locate and download a full-text article focusing on a curriculum-related use of technology with students. This research activity, a follow-up to the Internet/Web training sessions, was designed not only to require the teachers to apply the Internet/Web skills learned but

also to have them focus their research on student applications of technology. Leroy then used the articles as discussion starters for small groups of teachers.

The faculty resource room Leroy designed would, he hoped, provide a variety of resources to assist teachers in planning. Included in the plan for the resource room were technological resources such as a video collection, a VCR, and a computer with Internet connections as well as print sources such as teacher magazines and education journals. "I want the teachers to be surrounded by tools to help them find the best ideas for our students," he said.

It takes time. Leroy did not expect teachers to become comfortable with new technology when it was first introduced, realizing instead that much effort and persistence was necessary for teachers to master unfamiliar technology. For instance, Leroy set the tone for the technology committee at Ada Junior High School to work under this attitude in introducing Internet connections to every classroom. The staff development workshop planned and presented by the technology committee started with a brief overview demonstration. Pairs of teachers then used their classroom computers to locate Internet sites on curricular topics. The five members of the technology committee then moved from room to room, coaching and helping as teachers learned to perform hands-on research using Web search engines. In the weeks following the workshop, the coaching roles continued as teachers worked through the protocols enough times to become proficient. When teachers started using the Internet with students, technology committee members were "on call" to come and assist the teacher or the class. By the end of the school year teachers in the school felt fairly comfortable using search engines with the students. Holly, who described herself as a virtual non-user of technology until the

Internet staff development workshop, said, "Everyone was so patient. They stayed with me until I learned how to do it (use a Web search engine) well enough to take the risk to use it with my class. Now we use it all the time."

Let's be the front runners. The front runner attitude was prevalent at Ada Junior High School. Leroy consciously aimed to build a school that set the standard in many ways, including technology. He pointed to the school's use of high-end computers in the technology classroom, to the established school network, to the accessible computer hardware in the special needs classrooms, and to the Internet/Web access in classrooms. Although Leroy was not yet at the school when some of these programs started, since his arrival he has emphasized this attitude, especially regarding technology. In fact, the nucleus of high-use teachers in the school who had in the past been the technology flag bearers had continued to set a high standard for all of the teachers, and teachers themselves talked about how Ada Junior High School had deliberately worked to be an outstanding technology-using school.

There's always more to learn. The need for life-long learning related to technology was an attitude held by Leroy. Leroy commented that "today our information needs are too complex for us to be able to teach students everything. So what we have to teach them is how to learn, how to locate, analyze, and use information. That's where technology comes in." The continuous flow of staff development opportunities available to the teachers was a further confirmation of the belief in the necessity of continuous technology learning.

These attitudes about technology were not only held in various degrees by the principal in the study, but also were consciously cultivated in the school staff by the principal.

Technology-Related Behaviors

The technology-related behaviors of Leroy were analyzed using the eight-point model for effective use of technology in schools presented in *Making the Connection: Teachers and Technology* (U.S. Congress, Office of Technology Assessment, 1995). According to the OTA (1995), these eight factors contribute to the success of a school's technology program.

Selecting and implementing appropriate educational goals. Leroy played a significant role in selecting and implementing the appropriate educational goals related to technology. "Leroy sets the tone for what we do at Ada Junior High School with technology," said Lisa. The computer, for instance, was not viewed as a flashy electronic workbook. Instead, Leroy emphasized the roles computers could play in critical thinking, problem solving, and collaboration, thus bringing about changes in the educational culture of the school.

Creating a vision of curricular applications. At Ada Junior High School, access to the Internet/Web was available from each classroom, using electronic sources for research. Leroy helped to obtain additional computers for the yearbook and student newsletter staffs to help facilitate a superior product. School-wide staff development sessions conducted by the technology committee (of which Leroy was a member), focused on preparing teachers with the skills needed to help students with inquiry projects.

Leroy's approach to teaching technology was that each classroom teacher was ultimately responsible. It became evident that it was impossible for any one person at Ada Junior High School to work to embed technology into the activities for more than eighty classrooms. Leroy is attempting to move individual teachers toward greater integration of technology into their individual classrooms.

Assuring access to technology. Equity of technology access was a driving force in decisions made by Leroy. Teachers at Ada Junior High School have had some sort of computer on their desks since 1998. Classroom computers at Ada Junior High School were equitable because identical machines were all bought at the same time, as a result of the equipment standards for opening a new school.

High-use technology teachers complained that expensive machines were sitting virtually unused on low-use teachers' desks, while they are begging for more technology to use in their own high-use classrooms. Leroy was aware of the disgruntlement directed at teachers who did not use the technology available to them. At Ada Junior High School, Leroy worked to make the computer lab in one of the classroom pods available for group use. Leroy hoped that change would increase access to technology, particularly for high-use teachers.

Designing and delivering inservice training. Teachers and administrators at Ada Junior High School participated in their district's technology staff development opportunities. In the past, these training opportunities were voluntary, but Ada Junior High School was making changes that required technological competence of all teachers. For instance, all Ada Junior High School teachers will be required to check the daily

bulletin and student attendance on the computer. Training sessions will be offered to master its use.

Leroy had never used the teacher evaluation procedure to force teachers to become more adept at technology, but he envisioned that tactic as a real possibility to “get the attention” of low-use technology teachers, particularly if having classroom access to the Internet/Web did not get them involved with technology. Leroy was convinced that technology skills had become “requirements for teachers today. You simply must know how to use computers.” Leroy and the technology committee planned to emphasize the application and integration of the technology in the coming year.

Recent textbook “packages” – by frequently including not only textbooks but software programs, videos or videodiscs, electronic monitoring of skills mastered, and CD-ROMs, were another catalyst forcing teachers into integrating technology.

Increased technical support. The increased availability of emerging technologies like CD-ROMs, videodiscs, computer networks, and the Internet/Web had created an increased demand for technical support at Ada Junior High School. Although Leroy was supportive of efforts to add technicians in the district, technical help was still insufficient.

To relieve the burden that technology had placed on the media specialist and computer specialist as well as to provide better troubleshooting capabilities at Ada Junior High School, Leroy and the technology committee devised a student aide system to help with technology problems. If the student aide could not solve a teacher’s problem, William was asked. A district-level technician was requested when the problem could not be solved locally. Interview participants found this system to be successful for a number of reasons. First, teachers always had assistance as close as a verbal request. Second, the

skill level of the student aide (as well as that of the classroom teachers) had increased during the year this system had been used. Finally, relieving William of routine, low-level “I need help” calls had allowed him more time to deal with the complex issues of technology planning and implementation on a school-wide level. And yet, in spite of this system which broadened technical knowledge and leadership throughout the building, William remarked on the large part of his time that was spent in assisting others in learning technology and in performing basic troubleshooting.

Creating time. Leroy found creative ways to provide time for teachers to learn about technology use. When needed, Leroy would mentor teachers one-on-one in their classrooms, helping them master some aspect of a computer program. Leroy hoped the teacher resource room he was implementing, which would include a workstation to search the school network as well as the Internet, would provide a much-needed time and place for teachers to learn and plan to use technology with their students.

High-use teachers and Leroy alike realized that it was impossible for the school to provide enough paid time for teachers to adequately learn technology. Holly summarized this dilemma by saying,

When we got the Web in our classrooms, I knew that I would have to use my own time to learn to use it on a higher level. My experience with technology is that a staff development workshop just begins to scratch the surface of what there is to learn. All teachers need to understand that they can’t learn it all in an after-school workshop.

Expecting preservice training. Leroy agreed that any preservice student teacher experiences would include teaching with technology. An Ada Junior High School teacher

who supervised preservice teachers commented that “today’s student teachers are coming in generally knowing more about technology than the rest of us, though they need practice in integrating the technology.”

Ada Junior High School included technology experience and technology skills questions as part of the interview process for new teachers. Candidates were asked to describe ways they have used technology with students as well as personally. Recently hired teachers at Ada Junior High School commented that more experienced staff members often regarded new teachers as experts in technology and frequently approached them with questions about using technology.

Technology-Related Skills.

Technology-related skills of Leroy were found to be focused in these four areas: (a) personal technology use skills, (b) leadership skills, (c) supervisory skills, and (d) administrative/management skills. The category of personal technology skills emerged during the course of this study. The latter three categories are based on the National Association of Elementary School Principals publication, *Proficiencies for Principals: Elementary and Middle Schools* (1991) and provide a framework for describing Leroy’s skills related to technology. Those categories were discussed previously.

Personal technology use skills. The data from this study suggest that secondary school principals need to have a firm grasp of basic technology skills in order to be credible with their students, teachers, other district employees, and the community at large. Basic computer applications such as word-processing, graphics, databases, library catalogs and periodical indexes, e-mail, and Internet/World Wide Web navigation tools were fundamental skills that Leroy possessed. Interviews with teachers indicated that

without a basic knowledge and active use of technology, Leroy would not have had enough credibility with the school staff to successfully serve as a technology leader.

The data from this study do not suggest that it is necessary for a principal to be a “super user” or a “techie” in order to be effective in working with technology in a school setting. Leroy did not possess a deep depth of technology skills. He developed his technology expertise primarily through participating in the school and district’s staff development programs. The self-reported data in this study showed that Leroy had gained a skill level on par with that of the high-use teachers in his school.

Leroy reported that his formal training in educational administration did not include any information about technology, either the use of technology or decision-making regarding technology. Nor did the educational administration programs in which he studied embed technology into the courses. “It would have made sense to learn to use a spreadsheet in a school finance class,” Leroy said, “but they didn’t do it that way when I took classes.” Leroy noted that

It seems like people who go into administration are more likely to be the people who also have done things with technology. The adventurous sort. When I talk to people about what they are using and how they are using technology as a leader, a lot of them are comfortable. They are e-mailing like crazy, getting advice and help from all sorts of people. So how they pick that up if they are my age would be the same thing I did: figure it out themselves, work with somebody.

Leroy agreed that school administrators who were not themselves familiar with technology should immediately identify knowledgeable people who could assist with technology decisions, whether these people were within the school and district or within a

larger personal network. Leroy also said a principal who was not comfortable with technology should “trust those that know more and take classes as quickly as you can. My best advice would be to involve your stakeholders in the decision-making process.”

Technology leadership skills. The remaining data related to this question will be examined within the framework of the 1991 publication of the National Association of Elementary School Principals, entitled *Proficiencies for Principals: Elementary and Middle Schools*, which groups proficiencies under these categories: (a) leadership proficiencies, (b) supervisory proficiencies, and (c) administrative/management proficiencies.

The NAESP document does not specify technology as a discrete proficiency for principals; in fact, it mentions technology only twice: “the proficient principal. . . .uses current technologies to communicate the school’s philosophy, mission, needs and accomplishments. . . .” (p. 7) and “uses the latest technology for effective school management” (p. 16). However, the principals’ role in technology could be inferred in statements such as the following, which describe the proficient principal as one who (a) initiates and manages constructive change, (b) explores, assesses, develops, and implements educational concepts that enhance teaching and learning, (c) seeks appropriate resources of time, money, personnel, and materials to support the identified curriculum, and (d) regularly assesses the teaching methods and strategies being used and ensure that they are appropriate, varied and effective.

A number of significant leadership skills stand out in the analysis of the technology leadership of Leroy in this study. First was his creation of a vision of how technology should be used by teachers and students in his school. Proficiencies for

Principals (1991) states that the proficient principal “exercises vision and provides leadership that appropriately involves staff, parents, students, and the community in the identification and accomplishment of the school’s mission” (p. 6). Four of the five interview participants who described Leroy as a technology leader used vision-related terminology:

He has a vision of where Ada Junior High School should be and he pushes to get us there. (Holly)

Leroy sees the big picture, a vision of where other schools are and where he wants us to be. (William)

He sees the future and knows how technology will be a part of education. (Lisa)

Leroy is always open to new ideas, trying new things to keep us moving toward the future of education. (Zach)

At Ada Junior High School, teachers’ adaptation of new technologies followed Moore’s (1991) adoption of technology life cycle model fairly closely, indicating a broad continuum of technology skills and comfort. Teachers also had a variety of learning styles for new technologies: some teachers learned by trial and error, some preferred demonstrations, some read articles and manuals, and some needed extensive one-on-one mentoring to master the skills needed to manipulate new technologies. The involvement of the student aides and the technology committee at Ada Junior High School provided many opportunities for dealing with the diverse needs of the faculty.

A final leadership skill identified in this study is the ability to lead a school through significant change. This skill draws together proficiencies in visioning, communicating, and group involvement. Since his arrival, Leroy successfully modified

the organizational climate of his school in terms of technology. His school has moved to a more articulated vision of the technological future of the school, with more people involved with integrating technology and with planning for the future.

Technology supervisory skills. The principal in this study was intricately involved with supervising the technology-related aspects of curriculum and instruction in his school. He placed an emphasis on embedding technology into day-to-day learning of students rather than teaching technology as a discrete, isolated set of skills. This method was effective as a stimulus to bring about teachers' integration of technology into classroom curriculum.

Leroy was moving toward technology benchmarks and expectations that applied to all teachers rather than only to newly hired teachers and teachers who chose to learn to use technology. Since computers were first introduced three years ago, the standard procedure for staff development had been to offer technology training opportunities on a voluntary basis to those teachers who were interested. Attempting to require technology training for teachers who were reluctant to use technology seemed to produce negative results.

Leroy was moving closer to requiring technological competence in the performance of all teachers, just as other competencies such as cooperative learning and writing process strategies were required of all teachers. At Ada Junior High School, technology training had become less voluntary, with required full-day in-school workshops designed to provide learning opportunities for all teachers. The workshops had either included or been followed by intensive one-on-one mentoring sessions for teachers with undeveloped technology skills. Follow-up assignments such as locating and

sharing a Web article on a curriculum issue at a faculty meeting and working on the Web to research various subject matter served to keep everyone on the faculty involved and learning. The result of this intensive, continuous training was that all teachers gained enough confidence in using the Web to now feel comfortable using it as a research tool with their classes.

Although Leroy had yet used the teacher evaluation process to push reluctant teachers into learning about technology, Leroy indicated that, if necessary, he would use that process to improve teacher performance. Leroy argued that because newly hired teachers at Ada Junior High School had to demonstrate basic computer competencies as part of the interview process, "it makes sense that experienced teachers in the district should be held to the same standards." Leroy was reluctant to use the "heavy-handed" tactic of evaluation, preferring instead to create a school climate that made using and integrating technology an attractive and effective teaching methodology that all teachers would want to utilize with their students.

Technology administrative and management skills. The most significant technology-related skill in the administrative and management area as identified by Leroy was his commitment to shared decision-making, which he noted was crucial to his management style. Use of the technology committee was one way he implemented a shared decision-making. Committee membership was determined by teacher interest. The involvement of teachers in the committee structure served to spread out both leadership and ownership issues.

Technology issues at Ada Junior High School were usually funneled to William, the computer specialist. For instance, when a teacher said she didn't know how to use

CD-ROMs. William arranged for a mini-workshop after school. However, the workshop was poorly attended. Leroy noted that he tried to consult with the district technology division when he needed to make a technology-related decision, but in practice he did not always make that contact.

Leroy saw his technology-related public relations role as central to the political management of his school. Leroy was instrumental in helping to inform the Ada Junior High School community about the importance of technology for the school when during Open House a video production was presented to all parents through televisions in each classroom. "Public relations is a big part of my job," he said. "A principal is constantly in the public eye, representing the school to the community."

Research Question Two

This study confirmed the importance of Leroy's role of technology leader, technology manager, and technology politician as described by Kearsley (1990). Even though interview participants at Ada Junior High School described technology-related roles played by Leroy that fell within the technology leader, manager, and politician classifications, Kearsley's "three-hat" model proved to be too limiting for the complexity of the technology-related aspects of the junior high school studied.

Using Kearsley's (1990) three-role model of technology leader, manager, and politician as a basis for the question, interview participants were asked to identify and then describe the role or roles they say Leroy played in the technology arena in their school. While respondents identified aspects of Leroy's role that fit with Kearsley's three-role model, their responses further extended the model by adding four roles concerning technology: teacher, model, encourager, and facilitator.

Technology leader. All of the interview participants who worked at Ada Junior High School identified Leroy as a technology leader. Leroy's key technology role was seen as that of providing leadership to the school. Teachers and the media specialist valued the current principal for having a much more active involvement with technology. Mary, who served on the technology committee with Leroy, described Leroy's role as being "very supportive."

Holly commented that Leroy is "definitely a leader for the staff in this school." Last year when Holly first involved her sixth grade reading students in an Internet project, the suggestion for the project came from Leroy who had read about it in a journal. It was this project that speeded the purchase of the presentation software to display the computer screen on a TV monitor so the class could all participate in the activities. Again, the purchase of the needed equipment came about through Leroy's leadership.

"Leroy sees the future of teaching and learning with technology, and that is exciting," Lisa said.

He really wants us to be able to have the best technology in our classrooms for our teaching. He knows what schools in other places have, and he wants Ada to have it also.

Zach observed that Leroy "has been a leader in believing that all the staff should be the technology teachers. He's really committed to that." Zach agreed with this philosophy, though he was a little concerned about the few teachers who had not begun to use technology with their classes. "Some teachers will have an awful lot to learn to get caught up with the latest technology." He predicted that Leroy's leadership might have

come into play with this issue. Zach also stated that Leroy was “open to new ideas, he wants us to try new things, new approaches, new methods.” He commented that “I don’t think he’s ever put a stop to anything connected to technology that we wanted to do.”

Leroy also said that “leader” was his most important role, noting that he tried to “see the big picture of technology.” He believed “You sort of have to know what is going on out there and try to keep abreast of it so you can bring that vision back. The vision gets articulated in many different ways.”

He was convinced that “I have to be a visionary. I am always open to new ideas and am willing to try new things.” He also described his role sometimes as to set the standard for technology involvement.

Technology manager. In contrast to the technology leader role, not as many participants identified Leroy as playing the role of technology manager (i.e., four out of five interview participants). Others in the school had considerable technology management responsibilities; the computer specialist, for instance, carried considerable technology management responsibility, particularly for day-to-day tasks. At Ada Junior High School, William managed the school network, the classroom computers, and the day-to-day management responsibilities. The principal’s management responsibilities were viewed as being on the school-to-district level rather than within the school.

Leroy described one of his roles as “definitely a manager. The school needs to operate on a day-do-day basis. Technology takes a lot of attention to keep it going smoothly.” Leroy saw himself as a resource person for teachers.

I can’t teach your classroom. I know what I would do if I were in there, but I can’t teach your classroom. It is your responsibility to teach your classroom, but do you

need some resources to do this? How can I help you? That is my job, to get those resources. That's where the managing comes in.

Lisa pointed to Leroy's role in providing every classroom with a printer as an example of being a manager. Leroy's role involved getting the necessary software ordered and then loaded onto everyone's computers, planning the training sessions with William, and listening actively to problems that needed to be solved to "debug" the system.

Technology politician. Leroy believes that the technology politician role was not one he particularly enjoyed, even though he (as well as three out of five of the interview participants) identified the role as one he played. All three used words to identify Leroy's role: (a) "stands up for us to get what we need," (b) "fights for what we need," (c) "fights for our fair share," and (d) "is not afraid to say what our needs are." William also used the word "fight" to describe Leroy, but went on to say that "we've gone toe to toe over some things" and sometimes he fights too hard. Sometimes he's not willing to see that other needs might have greater priorities. The role was particularly tied to financing technology, which is an on-going challenge. Ada Junior High School's district has a decade-long tradition of more equitable distribution of technology funding. Leroy did not have to argue for school-to-school equity.

Leroy talked about why he thought it was important for him to be on the technology committee. "They may not always talk about stuff that directly impacts the school, but I think I need to see technology from the big picture standpoint. Another aspect of the technology-related politician role that Leroy believed in is what he called "the public relations part," where he sometimes had to "encourage and on occasion even

coerce” people to move ahead and to see the possibilities connected to technology. He saw the politician role becoming more important as participative management and shared decision-making increased:

We should always be making decisions based on what is best for kids and have it research-based. But there is always that element of power and control and politics. We have to be careful and sometimes agree to disagree with respect. But at the same time, we have to move ahead.

Technology teacher and technology model. The roles of technology teacher and technology model, two roles which emphasized the principal as an instructional leader, were mentioned by almost all of the interview participants. Interview participants’ responses which indicated any kind of direct instructional participation were classified in the teacher role. Leroy’s technology teaching was identified as being on a one-to-one, as needed basis, particularly with low-use teachers who needed more mentoring and guidance.

Two of the classroom teachers spoke of Leroy’s role as a teacher. He’d be surprised to hear me say that,” Holly admitted: “He doesn’t teach our technology classes. But he teaches us indirectly, through his example, like when he uses a really clear transparency in a staff meeting or shows us just part of a videotape. That sort of thing.”

Leroy agreed that he was “by no means a technology instructor.” At the same time, he said he looked on staff meetings as “a chance to teach, to present information in the best way possible.” He intentionally used a variety of media and technology at staff meetings (overheads, videos, etc) not only to deliver information but also to demonstrate to teachers how they could be using the technology. Part of his goal in taking a multi-

media course, he said, was “to develop a classy presentation” about the school that he could use for Open House night.

A closely related role, that of technology model, was identified by all interview participants. Along with the role of technology leader, technology model was the role most frequently mentioned by interview participants. Responses were categorized in this role when they described actual use of technology rather than instruction in using technology. To see the principal actually using technology as a natural part of the day – using e-mail to gather information, locating a Web site to use with appropriate curriculum, making a clear transparency for a faculty meeting – was mentioned more often by interview participants than direct instruction about technology.

Lisa commented that “kids see him use the computer in the media center or labs when he was out and about in the school.” Lisa commented that one reason Leroy could offer suggestions for integrating technology was that he was knowledgeable about the school curriculum because he spent a lot of time in classrooms.

Leroy described himself as having a “hands on” style as a principal: “I like to know what’s happening in my school. I like to be involved, to stay in touch.” This involvement extended to technology. A behavior that Leroy consciously tried to model was participating in technology staff development classes and workshops. He attended all workshops available to his staff during the school year. Believing that “if it’s important for my staff to know, it’s important for me to know.” The district offered a few separate training sessions for administrators, and Leroy said “I believe that it’s important for the staff to see the administrators out there learning and struggling, just like they are.”

Technology facilitator. Another role identified by the study was that of technology facilitator. Two teachers used the word “facilitator” to describe Leroy’s roles in technology. The role of technology facilitator could be viewed as part of the technology manager role, but because interview participants used different terminology and situations to describe the two roles, this role was classified separately. The term *facilitator* was used within the context of trying something new (William said Leroy facilitated adding the student aides to assist with the computer labs). Manager was used to denote maintaining an already existing procedure (Leroy managed the technology-related parts of the budget efficiently).

William said that Leroy “facilitated getting student aides for the computer labs.” and Zach said that Leroy “facilitates what we want to do – if we want to experiment with something, he helps us get what we need.” An example Zach described was when Leroy gave permission for the yearbook advisor to have extra computers in her classroom, when each room was slated to receive only one. Leroy helped the advisor find additional carts and the right extension cords so that all of the computers could be used in her room.

Technology encourager. The last role identified by this study was that of technology encourager. All of the interview participants at Ada Junior High School provided descriptions that were categorized in this classification. Teachers at Ada Junior High School mentioned that Leroy constantly reassured them that “It’s okay, you can do this,” and that he had fun with technology and thus encouraged them to be involved, too.

“He’s sort of a cheerleader for us,” Lisa said. “He cheers us on when things get complicated, when the network is down.” Mary mentioned Leroy’s positive attitude in trying to get everyone involved with technology. As long as the students were receiving

technology training in the computer labs, technology use by teachers had been more or less voluntary. William noted that the “voluntary part is now changing to more of a requirement,” spurred on with changes instigated by Leroy: adding electronic attendance the following school year means that everyone will have to use the computer at least once a day.

Leroy used the word “nurturer” to describe his encourager role. He saw himself as a nurturer of teachers as well as kids: “It’s sort of like parenting people you care about. You want them to grow in the right direction.” Having a positive attitude to technology’s role in the school was important to Leroy,

especially when the network’s down and the printers aren’t working. That’s the time I have to step in and say, ‘Just think how great this will be when our students will be able to print things off the Internet.’ That’s the kind of encouragement I mean.

Technology role analysis. Data gathered from the school site indicated that Leroy played a multi-faceted role concerning technology. The situation and the circumstances influenced the type of role the principal needed to play, resulting in a situational approach to involvement with technology in the school.

Leroy said that he “plays different roles depending on the situation, on what needs to be accomplished.” William, for instance, commented that “Leroy does whatever needs to be done when he thinks something is needed.” For various situations Leroy performed roles as leader (saw the vision for how the position could improve teaching and learning), manager (checked contracts and budgets), politician (lobbied the district to make the

computer specialist position full-time), and facilitator (provided student aides for the computer specialist).

Leroy seemed to decide which technology-related role to play depending on the circumstances. The roles of leader, model, and facilitator were described as being played by the principal both internally (within the school) and externally (in the district and community). The manager and politician roles were particularly described as influential at the district level. Finally, the roles of teacher and encourager were most frequently associated with school rather than district activities. A strong sense of situational context, then, determined the role assumed from the array of roles Leroy had at his disposal.

Chapter Summary

Chapter 5 focused on the findings for the two research questions. The first question concerned technology-related attitudes, behaviors, and skills of a junior high school principal in the study. Technology-related attitudes were identified by phrases from the principal's interviews and included the following: (a) we're all in this together, (b) keep it positive, (c) give it a try, (d) you can do it, (e) learn from mistakes, (f) let's do what's best for kids, (g) it takes time, (h) let's be the front runners, and (i) there's always more to learn.

Technology-related behaviors were analyzed in the context of the U.S. Congress Office of Technology Assessment eight-point model for effective technology use. They included: (a) selecting and implementing appropriate educational goals, (b) creating a vision of curricular applications, (c) providing access to technology, (d) designing and delivering inservice training, (e) providing technical support, (f) creating time, and (g) expecting preservice training.

Technology-related skills for the principal included: (a) personal technology use skills; (b) technology leadership skills such as communication and group process skills, (c) technology supervisory skills such as curriculum, instruction, performance, and evaluation, and (d) technology administrative and management skills that include organizational, fiscal, and political management.

The second research question focused on the technology-related roles of the principal. Many responses could be categorized into Kearsley's "three hat" model of technology leader, technology manager, and technology politician. However, the roles of technology teacher, technology model, technology facilitator, and technology encourager were also identified in the study. The situational nature of technology-related roles was emphasized.

CHAPTER 6

CONCLUSIONS AND DISCUSSION

Summary of Study

This study focused on the technology-related attitudes, behaviors, skills, and roles that contributed to technology leadership in a junior high school in southern Nevada, with particular emphasis on the school principal. Administrative support has frequently been found to be a contributing factor to successful use of technology in schools (Anderson & Dexter, 2000; Becker, 1994; Ely, 1995; Siegel, 1995). However, the meaning of administrative support has been addressed in only a small number of empirical studies (Thomas & Knezek, 1991; Wang, Johnson & Pisapia, 1994).

In order to better describe administrative support of technology, an in-depth qualitative investigation of a junior high school principal in a technology intensive secondary school was conducted. The primary research questions for this study were as follows:

1. What are the instructional technology-related attitudes, behaviors, and skills of a junior high school principal who serves as a leader in a school with a technology-enriched program?
2. What role does this principal play regarding instructional technology in the school?

Conclusions

This study supports the following major conclusions concerning the principal and the school's technology program:

1. The support of the principal is central to an effective school technology program.
2. An effective principal is personally and directly involved with the school technology program.
3. As appropriate for the situation, the principal assumes a variety of roles concerning technology, including leader, manager, politician, model, teacher, facilitator, and encourager.
4. The principal can be a catalyst to motivate non-use and low-use teachers to become more involved with technology.
5. An effective principal utilizes some form of school-level shared decision-making process for technology-related decisions.
6. When hiring new teachers, the effective principal tries to hire technology-competent candidates with positive attitudes to using technology.
7. An effective principal has achieved an adequate level of personal technology use skills and is a lifelong learner about technology.
8. When the principal expects adequate technology skills from all teachers, technology competency becomes mandatory rather than voluntary.

Centrality of administrative support. The data collected at the site studied clearly indicated that without the support of the principal, the technology program of the school would not have evolved to the level of curricular integration and teacher involvement that

had been achieved. The principal provided several key components: (a) vision concerning the educational goals of the school, (b) commitment to integration of technology, (c) technical and financial support for classroom computers, (d) school labs, and (e) high expectations for technology skills of newly hired teachers. Administrative support was the one crucial element that made effective use of technology possible in the school site studied.

Involvement with technology. Interview participants agreed that the principal's positive attitude toward and personal commitment to technology had been a crucial factor in the school's effective utilization of instructional technology. The principal, since his arrival, was directly involved with the school's technology program, both as a user of technology and as a leader of the school. His positive influence was seen as instrumental to the development of a technology-rich culture which attempted to involve all teachers at the school.

Multi-faceted technology-related roles. The principal in this study played multi-faceted roles concerning technology in his school. The three roles of technology leader, technology manager, and technology politician detailed by Kearsley (1990) did not adequately describe the complexity of the principal's role as identified by this study. Four additional roles were found to be significant in the effective use of technology in the school. These emerging roles included (a) technology teacher, (b) technology model, (c) technology encourager, and (d) technology facilitator.

The roles of leader, model, and facilitator were found to be played by the principal both within the school and within the district. The roles of manager and politician were primarily aligned with the principal's relationships at the district level.

Day-to-day management of the technology program was handled by others at the building level. The principal's roles as manager and politician tended to be at the district and even community level rather than the school level. Finally, the roles of technology teacher and technology encourager were associated with activities and relationships within the school rather than in the district as a whole.

The role chosen by the principal for a particular situation was strongly guided by the situational context. For example, some interview participants specifically identified the principal as a technology teacher and encourager who provided continual positive support for technology learning and use within the school building. Without this on-going support from a principal who obviously cared about them, the interview participants indicated that it was unlikely that they would have grown enough in their technology skills to use technology successfully with their classes. Effective technology-related administration at the school required considerable flexibility and skill in determining when various roles were most appropriate.

Catalytic technology-related behaviors. The principal spent considerable time with low-use teachers to help create a comfort level in those teachers. Interview participants identified the introduction of easy classroom access to the WWW and the principal's commitment to curricular applications of the Web as critical steps in involving even the teachers who for years had been actively avoiding technology use. The principal's decision to implement a mandatory grading system was a direct catalyst for the low-use teachers to become more involved with using technology. The principal had a hand in establishing continual staff support to help teachers learn new technologies. Without the catalytic effect of the principal's commitment, it is unlikely that the low-use

teachers would have been motivated enough or comfortable enough to begin to use technology with their students.

School-level shared decision-making for technology. The principal described his decision-making process as being participatory and allowing for teacher input and feedback. The mechanism of a school-level technology committee seemed to have made the sharing of leadership and decision-making easier to implement. The evidence from this study suggests that the deliberate development of bottom level leadership at Ada Junior High School, particularly through empowering an active school-wide technology committee, resulted in rapid, inclusive, and committed participation in technology on the part of teachers.

A school-wide technology committee, combined with a principal who takes an active role in seeking and listening to advice concerning technology, seems to be crucial for a school that desires to create and maintain vision, disseminate information, and share technology leadership as well as knowledge.

Hiring technology-competent teachers. The principal tried to hire technology-savvy candidates for new teacher positions. Candidates were asked to describe their technology experience. Newly hired teachers indicated that more experienced teachers looked to them as technology experts.

This study suggests that schools and districts may need to look at technology-related policies for beginning teachers within a different framework. A new teacher who has literally grown up using technology operates within a different technology paradigm than a veteran teacher who is inexperienced with and perhaps even fearful of technology.

As more and more technology applications become accessible in classrooms (e.g., email, Internet/Web access, and school and district networks), school administrators should be cautious about using only activities in the school's public places such as computer labs and the media center to determine the level of technology use of teachers.

Developmental technology skills. The analysis of the data gathered for this study suggests that a principal does not have to be a highly skilled user of technology in order to be effective in dealing with technology decisions. When viewed on a continuum of personal technology use skills as indicated by Moore's (1991) technology adoption model, the principal was an innovator and early adopter, comfortable with any aspect of technology. Leroy learned new technology easily by personal experimentation, particularly when he was thinking of ways to apply that technology to schools.

Leroy was described as effective in leading the school's technology program and in motivating teachers to integrate technology into the school curriculum. Clearly, the results of this study suggest that as long as the principal is an active technology user and learner, it is not necessary for the principal to be highly skilled in order to effectively work with a school's technology program.

Mandatory technology competencies. During the time of this study, the principal was guiding his staff toward required rather than voluntary technology expertise and implementation. As technology became solidly integrated into the curriculum and daily activities of the school, its use could no longer be voluntary but instead became a skill that all teachers had to master. Classroom access to the Internet/Web and curriculum-based Internet/Web workshops held at Ada Junior High School provided continual support for all teachers.

Discussion

This study was designed to expand the body of literature that focuses on the complex relationships between the principal and the school's technology program. Previous literature in this field has been almost entirely based on anecdotal experience or opinion rather than on documented research.

This study was designed to collect credible evidence about a school administrator and technology. The study site was chosen first and foremost for its reputation as a technology-using school that was integrating technology into the curriculum and had adequate technology to support teachers and students. Secondly, a site in which the principal contributed to the school's technology leadership was chosen, thereby helping to guarantee that the study would focus on a strong, exemplary subject. Finally, the qualitative case method was chosen for this study so that in-depth data from a variety of sources would contribute to a rich description of the principal's relationship to technology in his school.

At the same time, the researcher anticipated that this study would support some of the assertions and suggestions made in the relevant opinion and experience-based literature. As expected, descriptions of the principal in this study confirmed some of the previous literature. Finally, the study results expanded the literature in significant ways. The various ways that this study's results confirm or expand the literature is discussed below within the context of the technology-related attitudes, behaviors, skills, and roles of the principal.

Technology-Related Attitudes

The most important attitudes identified in this study had to do with the principal's willingness to be directly involved in a positive manner with the school technology program. Bailey and Lumley (1994) noted that to be credible, administrators should participate in all aspects of the technology program. Other writers also emphasized the benefits of an administrator's positive, participative approach to technology (Kearsley & Lynch, 1992; Ely, 1995; Schultz, 2000; Siegel, 1995). Another attitude identified in the study was his commitment to lifelong technology learning, as suggested by Rockman and Sloan (1993), Bozeman and Spuck (1991), Kearsley and Lynch (1992), and Bailey and Lumley (1994). These writers stated or implied that administrators can readily learn adequate technology through educational administration courses and technology workshops. However, this study challenges that implication when the principal described the commitment of significant time on his own to learn technology as a necessity. Donatucci (1994) and Rockman and Sloan (1993) suggested that technology training for administrators most effectively occurred with other administrators rather than teachers and administrators participating in the same sessions. Bailey and Lumley (1994) disagreed, contending that principals should learn alongside their teachers, an attitude held by the principal in this study.

Technology-Related Behaviors

The behavior of the principal has been described in this study through the Office of Technology Assessment's eight-point model for effective use of technology (U.S. Congress, 1995). However, the study results expanded the understanding of the OTA model by identifying administrative support as the broad base on which the other seven

facets of the model (i.e., technology suited to goals, vision of curricular applications, access to technology, inservice training, preservice training, technical support, and time) depend. The findings of this study are consistent with Becker (1994), who contended that the strongest technology programs were found where top down vision, leadership, and support for technology combined with bottom-up implementation of technology. The study also verified that technical support is crucial for effective school technology programs (Cory, 1990; Hurst, 1994; Ronnkvist, Dexter, & Anderson, 2000).

This study indicates that extensive integration of technology into the curriculum means that technology competency is no longer voluntary but rather mandatory for all teachers. The literature supports models of staff development that are ongoing (Hurst, 1994; Wilson et al., 1994) and that are based on hands-on opportunities (Dexter & Ronnkvist, 1999; Hurst, 1994; Siegel, 1995). In this study Ada Junior High School was found to have a particularly strong ongoing technology support program.

Technology-Related Skills

The work of Thomas and Knezek (1991), and Kearsley and Lynch (1992), suggested that administrators should strive to become sophisticated users of technology. In contrast, the findings of this study indicated that principals must have adequate skills approximately on a par with those of moderate use teachers in their building. The findings of this study suggest that if principals model technology use in their professional lives and continue learning new technologies, they do not have to be highly skilled users in order to be credible with their teachers. The principal in this study used technology to help him manage day-to-day activities of the school (i.e., email, voicemail, student

information databases, electronic attendance, word processed newsletters), as suggested by Donatucci (1994) and Kearsley and Lynch (1992).

A number of writers presented the importance of a participatory management style and a school-level technology committee (Bailey & Lumley, 1994; Cradler, 2000; Kearsley & Lynch, 1992; Rockman & Sloan, 1993), a finding substantiated by this study. The strong committee at Ada Junior High School was a foundation of the technology program's success. Technology plans were seen as crucial by a number of writers (Bailey & Lumley, 1994; Kearsley and Lynch, 1992). In contrast, Wang, Johnson, and Pisapia (1994) found successful technology infusion in two high schools studied, even though the two schools had different decision-making models. An urban high school had both a strong technology plan and committee while the rural high school had no written technology plan and no formal technology committee. In this study, Ada Junior High School had a strong technology committee and a written technology plan.

Moore's (1991) technology life adoption model, devised for businesses marketing new technologies to individuals, indicated that the technology laggards should simply be ignored. The principal in this study, in contrast, spent a great deal of his time and energy teaching and encouraging all teachers to use technology. This strategy was particularly effective in moving all teachers into Moore's late adopter category. The literature does not focus much on the principal's role in relationship to low-use or non-use teachers. Bailey and Lumley (1994) and Newsom (1996), among the few who discussed this issue, suggested that the training strategies that work with early adopters do not work as effectively with late adopters. This distinction is evident in this study, which identified

one-on-one mentoring by the principal as one of the most efficient ways to increase the technology skills of low-use teachers.

Consistent with the findings of Spuck and Bozeman (1988), Thomas and Knezek (1991), and Kearsley and Lynch (1992), the principal in this study had not learned about nor used technology as a significant component of his educational administration licensure program. Instead, Leroy was basically a self-taught, highly skilled technology user. Leroy agreed, however, that his educational administration program would have been strengthened by the infusion of technology into the program's curriculum.

Technology-Related Roles

Three roles an administrator plays regarding technology (i.e., leader, manager, politician) were specifically described by Kearsley (1990). Evidence from this study corroborated these roles but at the same time four additional roles emerged. Additional roles identified were (a) technology teacher, (b) technology model, (c) technology facilitator, and (d) technology encourager. Kearsley and Lynch (1992) emphasized that technology leadership roles could be played by a variety of individuals within a school, and that even a committee could be a technology leader. Dede (1994) also promoted this kind of shared leadership as a way of extending technology knowledge and skills. Also, Newsom (1996) found that an intensive technology classroom program was most successful when the principal supported the program but teachers took the leadership. The data gathered at Ada Junior High School particularly corroborates Newsom's concept about technology leadership roles. Rather than taking on the primary technology leader role when he came to the school, Leroy instead deliberately spread technology leadership throughout the school, both by means of a technology committee and the

hallway technology mentors. The result of this shared leadership was evident in the school's culture, which valued experimentation, play, and integration of technology into the curriculum.

Recommendations

Directions for further research in the area of technology and the school administrator emerged from this study. Implications for practice for school principals, school districts, and educational administration programs also became apparent from the results of the study.

School principals. School principals can make a number of choices to help create or maintain a strong, effective school technology program.

1. Principals should be actively involved with technology. By being active in the school technology program, principals send powerful messages to teachers, who in turn can motivate teachers who might otherwise stay on the periphery of technology use.
2. Principals should maintain and model a level of personal technology skill approximately on a par with moderate-use teachers. It is not necessary for a principal to be highly skilled in technology to be effective in providing technology leadership in a school.
3. Principals should identify and then frequently consult knowledgeable people about technology matters. The complexities of technology necessitate a principal's relying on others (i.e., media specialist, high-use teachers, technology teachers, district technicians, and district technology coordinators) for advice.

4. Principals should use some variation of school-level shared decision-making for effective technology decisions so that technology leadership is distributed throughout the school. A school-level technology committee that is actively involved with technology planning can be a source of quick and accurate information for school principals.
5. Principals can be the catalyst to help bring non-using or low-use teachers into more active technology utilization. If principals allow even a few teachers to remain in the low-use category, over a period of years the number of students who are in turn deprived of using appropriate technology in the curriculum rises quickly.
6. Principals need to help their schools devise and implement a staff development scheme that provides on-going training opportunities and support. Like any other skill, technology skills take time and continual support to master.

School districts and school boards. Many of the suggestions for principals to be effective technology leaders in their schools apply to school district administrators as well.

1. District-level administrators should make it a practice to consult knowledgeable people before making technology decisions. A shared decision-making model in the district increases the likelihood that the right people will be consulted about technology decisions prior to a commitment to equipment and software.

2. Flexibility in technology staff development opportunities may help schools provide the continuous support needed for technology mastery and curriculum integration. For example, allowing a school technology committee to plan, instruct, and evaluate in-school training sessions for an entire school staff will help to increase the skill level of all teachers.
3. When districts hire or appoint new principals, determining a candidate's technology-related skills and attitudes should be a part of the interview process. A principal's willingness to be active in the technology program seems to be a key to effective use of technology in the school.
4. School districts should require that growth in technology be part of every administrator's annual professional development plan. This is particularly crucial if current administrators are not comfortable with technology.

Educational administration programs. The final recommendations that emerged from this study have implications for the graduate educational administration programs that prepare principals.

1. Educational administration graduate programs should expect or even require incoming students to possess basic computer use skills such as word processing and database manipulation. Graduate programs can assure that new principals will be technologically competent by requiring basic computer use skills.
2. Additional technology skills, including leading-edge technologies, should be integrated into the educational administration courses as appropriate. For

instance, manipulating spreadsheets and evaluating electronic budget software would be part of a school finance course.

Limitations

This study was limited to only one secondary school in a specific location, and thus the findings are not generalizable to technology leadership in all secondary schools. Also, because data collection was limited to the spring of 2001, technology-related activities from other times of the school year were not observed first-hand. Although an attempt was made to interview a wide variety of participants using open-ended questions, information pertinent to the study may have been missed because the interviews started from a preconceived set of questions. The study may thus have been limited by the participants chosen, the number of interviews, and the capacity of the participants to understand, interpret, and truthfully share information with the researcher.

Additional limitations to the study revolve around potential researcher biases. As a secondary school administrator who supervised the computer department, the researcher had a preconceived commitment to effective uses of technology in schools. As an experienced secondary classroom teacher, the researcher had a bias toward teaching styles that emphasis student involvement, a positive classroom climate, multidisciplinary approaches, and integration of technology into the curriculum. Throughout the study the researcher attempted to be conscious of these biases and to not discount data which might have contradicted those preconceived ideas. It is possible that a different researcher might have reached different conclusions in this study.

Chapter Summary

The purpose of this case study was to explore and describe the technology leadership in a junior high school in southern Nevada, with emphasis on the technology-related attitudes, behaviors, skills, and roles of the school principal. Technology-related attitudes, named by phrases from the principal interview were identified: (a) we're all in this together, (b) keep it positive, (c) give it a try, (d) you can do it, (e) learn from mistakes, (f) let's do what's best for kids, (g) it takes time, (h) let's be the front runners, and (i) there's always more to learn. Behaviors related to instructional technology included (a) selecting and implementing appropriate educational goals, (b) creating a vision of curricular applications and integration, (c) providing access, (d) designing and delivering inservice training, (e) providing technical support, (f) creating time, and (g) expecting preservice training. Technology-related skills included (a) personal technology use, (b) communication, and (c) group process skills. In addition to Kearlsey's three roles of leader, manager, politician, the study identified four other technology-related roles: teacher, model, facilitator, and encourager.

The study has implications for people who want to support computers and other educational technology, including principals, school districts and boards, and educational administration faculty. Effective principals should (a) be actively involved with technology; (b) maintain and model personal technology skills, (c) consult knowledgeable people about technology, (d) use school-level shared decision-making such as a technology committee, (e) serve as a catalyst to motivate low- and non-use teachers, (f) help implement ongoing, curriculum-integrated, mandatory technology staff development, and (g) consider technology skills and attitudes when hiring new teachers.

School districts and school boards also should (a) consult knowledgeable people about technology decisions, (b) help to provide continuous support for technology mastery and curriculum integration, (c) consider technology skills and attitudes of potential principals, and (d) require technology growth as part of administrators' professional development. Educational administration programs should expect or require basic computer skills and integrate high-level technology skills into the graduate curriculum.

APPENDIX A

Letters

Letter to Principal

Principal (use real name)
Junior High School (use real name)

Dear Principal (use real name),

I am interested in finding out what are the technology-related attitudes, behaviors, and skills that play a role in a school's technology program with emphasis on the principal. I hope you'll be pleased to know that your school meets the criteria for this research. It is a school that is established and uses technology.

As part of my work toward an Ed.D. degree in Instructional Technology at the University of Nevada, Las Vegas, I would like to focus on your school for a qualitative research project. I believe that this study would be beneficial to you, your school, and your district as well as to others as it helps to identify and analyze the previously mentioned factors that play a role in technology leadership. I hope you'll agree to your school's involvement in this project.

I would like to spend some time in your school visiting with a number of people, examining a number of sources of information, and observing technology-related "goings on" in your school. I would, of course, like to interview you. I'd also like to interview your computer specialist as well as a range of teachers whose extent of technology use may vary. These interviews would be not more than an hour in length and would be scheduled after school. I'd also like to examine a variety of documents related to technology (technology plan, staff development plans, that sort of thing).

Who am I? I have been employed with the Clark County School District since 1978. I began working with the district as a business/computer teacher. I have also served as an educational computer specialist. I am presently a junior high school administrator where I previously oversaw the computer and industrial technology departments. My interest in the effective use of technology in schools, then, stems from both my previous teaching experience and my present job.

Because your school is established and using technology, you and your staff have insights and experiences to share that will be valuable, not only for me, but for other school and district administrators, university educational administration faculty, and teachers. If you have questions about the study or your school's participation in the study, please call me (799-3400 days, or 631-7386, evenings). If you wish, you could also contact my major advisors for this research project (Dr. Randy Boone and Dr. Kendall Hartley, Department of Curriculum and Instruction, University of Nevada, Las Vegas).

Thank you for considering the contribution your participation in this study could make. I'm looking forward to hearing from you soon.

Sincerely,

Alvin W. Matthews

Reputational Letter

Dear Learning Strategist/Computer Specialist/Media Specialist,

As part of the requirements for doctoral study at the University of Nevada, Las Vegas, under the guidance of Drs. Boone and Hartley, I am conducting a study to determine the technology-related attitudes, behaviors, and skills that play a role in a school's technology program with emphasis on the school principal. The sample for this study will be determined by a reputation-case study method. I am requesting that key members of your school nominate two low-end computer using teachers and two high-end computer using teachers. I am requesting your nominations by using the criteria below:

1. low-end user – A person who makes limited use of emerging technologies or technology-based learning activities.
2. high-end user – A person on the leading edge of technology, knows much about emerging technologies, usually experiments with technology-based learning activities.

The teachers nominated most frequently will be selected for this study. All responses will be confidential. I have enclosed a form on which you can indicate your nominees.

If you have any questions or need additional information please do not hesitate to contact me at 799-3400, ext. 250 (w) or 631-7386 (h). I would like to thank you in advance for your cooperation.

Sincerely,

Alvin W. Matthews,
Doctoral Candidate

Appendix B

Interviews

High-Use Teacher Interview

PERSONAL SKILLS

1. You've been identified as one of the teachers in the school who uses technology in the classroom. Tell me about your personal computer and technology skills.
2. How did you primarily learn what you know now about computers + technology? Describe the role your school or district played in your development as a technology-using teacher.
3. Suppose you wanted to learn about a new computer program or new piece of technology (like using a Zip drive). Tell me how you would go about learning to use it. Why do you think you'd use this process?

REASONS FOR USING TECHNOLOGY

4. What are the most important reasons you personally use technology? Describe any frustrations you might have with using technology?
5. What are the most important reasons your school uses technology?
6. What do you think constitutes a good education for students growing up in our Information Age society? Describe any reservations or apprehensions you might have about the use of technology in your school?
7. What are the most important reasons for using technology with your students?
8. Tell me about some things that go on in this school concerning technology that you think might not happen in other schools.

TECHNOLOGY LEADERSHIP

9. Identify and briefly describe the leaders concerning technology in this school. What role(s) do these leaders play in the technology arena? (information gatherer ...idea person ...supporter ...etc.).

SCHOOL CLIMATE

10. Briefly describe the teaching and support staff in your school.
11. Describe your school's staff's abilities in terms of technology.

SUPPORT FOR TECHNOLOGY

12. Surveys of teachers have found that they need "administrative support" to successfully use technology. Describe how your principal supports instructional technology in this school.
13. What other kinds of support do you need in order to use technology effectively? How could your principal help in that support?
14. Describe what you see as your principal's role regarding technology in your school. What metaphor would you use to describe that role?
15. Compare your principal's role in technology to his/her role in other aspects of your school (i.e. curriculum, evaluation, etc.).

16. How does the school and district support encourage efforts at technology use and technology leadership among teachers and others?

TECHNOLOGY PLANNING

17. Tell me about some of the most significant decisions your school has had to make regarding technology. How ere these decisions made? Who were the critical players? Why? How were teachers involved in these decisions? What role did the principal have in the decision-making process? What did you learn along the way that you might apply to other decision making situations?
18. Tell me about any technology-related problems your school still faces. What plans are being made for these issues? How are these plans developed?
19. If a new educational technology were available to your building, would you be likely to want to learn to use it? How would you go about learning it? Describe your school's technology training program. What is the role of the principal in the training program?
20. Imagine that your school received \$5,000 per teacher to improve computer and technology use in secondary education. How would you like to see that money used? Why?

IMPACT ON INSTRUCTION

21. What, if any, impact has technology had on the teaching and or curriculum in your classroom? in your school? What do you feel best about? What else would you like to see? How are you aiming toward that goal?
22. Describe what role technology skills attitudes of prospective teachers have in decisions on hiring new teachers.
23. What has made it possible for your school to commit to using technology? How do you decide what to abandon or de-emphasize (in curriculum technology practices policies)?

BUDGET

24. Tell me about your perceptions of the school's technology budget. What is your role concerning the technology budget? What role does the principal have concerning the technology budget?

ADVICE

25. Suppose a new teacher down the hallway asks your advice about how you deal with "all the technology stuff." How would you answer? How do you think a new teacher could best learn to use technology effectively? What role might the principal have in this learning process?

Greg Kearsley, who writes about administrators and technology, describes the principal as wearing three hats as a leader, manager, and politician. How does that description strike you? Which role seems to have most influence on you as a teacher? Which role, if any, describes your principal best?

Low-Use Teacher Interview

Conducted after first interview with principal.

PERSONAL SKILLS

1. Describe yourself as a "technology-using" teacher. Tell me about your personal computer and technology skills.
2. How did you primarily learn what you know now about computers / technology? Describe the role your school or district played in any development as a technology-using teacher.
3. Suppose you heard about a new computer program or new piece of technology (like using a Zip drive). Under what circumstances might you want to learn to use a new technology? Tell me how you would go about learning to use it. Why do you think you'd use this process?

REASONS FOR USING TECHNOLOGY

4. When you use technology, what are the most important reasons for doing so? Describe any frustrations you might have with using technology.
5. What are the most important reasons your school uses technology?
6. What do you think constitutes a good education for students growing up in our Information Age society? Describe any reservations or apprehensions you might have about the use of technology in your school.
7. Under what circumstances do you use technology with your students? What are the most important reasons for using technology with your students?
8. Tell me about some things that go on in this school concerning technology that you think might not happen in other schools.

TECHNOLOGY LEADERSHIP

9. Identify and briefly describe the leaders concerning technology in this school. What role(s) do these leaders play in the technology arena? (information gatherer ... idea person ... supporter ...etc.)

SCHOOL CLIMATE

10. Briefly describe the teaching and support staff in your school.
11. Describe your school's staff's abilities in terms of technology.

SUPPORT FOR TECHNOLOGY

12. Surveys of teachers have found that they need "administrative support" to successfully use technology. Describe how your principal supports instructional technology in this school.
13. What other kinds of support do you need in order to use technology effectively? What kinds of things might prompt you to use technology more? How could your principal assist in those circumstances?
14. Describe what you see as your principal's role regarding technology in your school. What metaphor would you use to describe that role?

15. Compare your principal's role in technology to his/her role in other aspects of your school (i.e. curriculum, evaluation, etc.).
16. How does the school and district support + encourage efforts at technology use among teachers and others?
17. How would you rate the district's support of technology? (1-10, 10 high) What is the role of the district in your school's technology program? What should be the role of the district in a school's technology program?

TECHNOLOGY PLANNING

18. Tell me about some of the most significant decisions your school has had to make regarding technology. How were these decisions made? How were teachers involved in these decisions? What role did the principal have in the decision-making process? What did you learn along the way that you might apply to other decision-making situations?
19. Tell me about any technology-related problems your school still faces. What plans are being made for these issues? How are these plans developed?
20. If a new educational technology were available to your building, would you be likely to want to learn to use it? How would you go about learning it? Describe your school's technology training program. What is the role of the principal in the training program?
21. Imagine that your school received \$5,000 per teacher to improve computer and technology use in secondary education. How would you like to see that money used? Why?

IMPACT ON INSTRUCTION

22. What, if any, impact has technology had on the teaching and/or curriculum in your classroom? in your school? What do you feel best about? What else would you like to see? How are you aiming toward that goal?
23. Describe what role technology skills + attitudes of prospective teachers have in decisions on hiring new teachers.
24. What has made it possible for teachers in your school to commit to using technology? How do you decide what to abandon or de-emphasize (in curriculum + technology + practices + policies)? Why do you personally not use much technology?

BUDGET

25. Tell me about your perception of the school's technology budget. What is your role concerning the technology budget? What role does the principal have concerning the technology budget?

ADVICE

26. Suppose a new teacher down the hallway asks your advice about how you deal with "all the technology stuff." How would you answer? How do you think a new teacher could best learn to use technology effectively? What role might the principal have in this learning process?
27. Greg Kearsley, who writes about administrators and technology, describes the principal as wearing three hats as leader, manager, and politician. How does that description strike you? Which role seems to have most influence on you as a teacher? Which role, if any, describes your principal best?

Principal's Interview #1

Conducted early in the study (after the Technology and Organizational Profiles)

PERSONAL SKILLS

1. Tell me about your personal computer and technology skills.
2. How did you primarily learn what you know now about computers - technology?
3. Suppose you wanted to learn about a new computer program or new piece of technology (like using a Zip drive). Tell me how you would go about learning to use it. Why do you think you'd use this process?

REASONS FOR USING TECHNOLOGY

4. What are the most important reasons you personally use technology?
Describe any frustrations you might have with using technology?
5. What are the most important reasons your school uses technology?
6. What do you think constitutes a good education for students growing up in our Information Age society? Describe any reservations or apprehensions you might have about the use of technology in your school.
7. Tell me about some things that go on in this school concerning technology that you think might not happen in other schools.

TECHNOLOGY LEADERSHIP

7. Identify and briefly describe the leaders concerning technology in this school. What role(s) do these leaders play in the technology arena?
(information gatherer ... idea person ... supporter ...etc.)

SCHOOL CLIMATE

8. Briefly describe the teaching and support staff in your school.
9. Describe your staff's abilities in terms of technology.

INFLUENCE OF TECHNOLOGY ON JOB

10. How has technology impacted your professional experience as a principal?

LEADERSHIP STYLE

12. How do you think the staff in this school would describe your role as a leader in the school? What metaphors might they use to describe that role?

Principal's Interview #2

Conducted after rest of data has been collected.

SUPPORT FOR TECHNOLOGY

1. Describe what you see as your role regarding technology in your school. What metaphor would you use to describe your role? (captain ...cheerleader ... etc.)

In what ways do your own personal skills in technology influence this role?

2. Compare your role in technology to your role in other aspects of your school (i.e. curriculum, evaluation, etc.).
3. Surveys of teachers have found that one of the most important things they need to successfully use technology is "administrative support." Tell me about how you try to support instructional technology in this school.
4. What other kinds of support would you like to be able to provide? Why don't can't you do this now?
5. How does the school and district support encourage your efforts at technology support and leadership? How are other technology leaders supported? Describe any barriers that exist in the school and the district that keep you from achieving what you'd like concerning technology.
6. How would you rate the district's support of technology? (1-10, 10 high) What is the role of the district in your school's technology program? What should be the role of the district in a school's technology program?

TECHNOLOGY PLANNING

7. Tell me about some of the most significant decisions your school has had to make regarding technology. How were these decisions made? Who were the critical players? Why? What did you learn along the way? How were you involved in these decisions?
8. Tell me about any technology-related problems your school still faces. What plans are being made for these issues? How are these plans developed?
9. If a new educational technology were available to your building, how would your teachers most likely learn to use it? Describe your school's technology training program. What is your role in the training program?
10. Imagine that your school received \$5,000 per teacher to improve computer and technology use in secondary education. How would you like to see that money used? Why?

IMPACT ON INSTRUCTION

11. What, if any, impact has technology had on the teaching and or curriculum in your school? What do you feel best about? What else would you like to see? How are you aiming toward that goal?
12. Let's say you're interviewing a prospective teacher. Does technology enter into the interview picture? Decisions on hiring? How?

BUDGET

13. Tell me about your perception of the school's technology budget. What is your role concerning the technology budget?

ADVICE

14. Suppose you meet a beginning principal in a nearby school who asks your advice about how to deal with "all the technology stuff." How would you answer? How do you think he/she could best help teachers and students learn to use technology effectively?
15. Greg Kearsley, who writes about administrators and technology, describes the principal as wearing three hats as leader, manager, and politician. How does that description strike you?

Appendix C

Profiles

Technology Profile

Your School

1. Circle the grades in your school: Pre-K K 1 2 3 4 5 6 7 8
2. Number of students in your school: _____
 Number of teachers in your school: _____ Number of other staff in your school: _____
3. What is the approximate population of the community area your school district serves? _____
 How would you describe your community? (rural, suburban, town, city, etc.) _____
4. Does your district have a full-time district coordinator?
5. Check this chart to indicate your school's technology-related personnel. Check all that apply.

	Professional	full-time	part-time	paid	volunteer
media specialist	_____	_____	_____	_____	_____
technology coordinator	_____	_____	_____	_____	_____
technician (not a teacher)	_____	_____	_____	_____	_____
other technology personnel Describe: _____	_____	_____	_____	_____	_____

Your School's Technology

1. Check all that apply to indicate your school's access to computers for student use.
 _____ accessible by any teacher's class
 _____ accessible by sign-up time only _____ individual student signup _____ class signup
 _____ accessible by individual students with teacher permission
 _____ accessible primarily or only during scheduled time (i.e. for teacher preparation time)
 _____ accessible primarily or only by "gifted/talented" students
 _____ accessible primarily or only by special needs students
 _____ accessible equally by girls and boys
 _____ other _____
 2. Are there separate computers primarily for teacher use available in the school? _____ yes _____ no
 If "no," go to question 3.
 If "yes," which type of computer do teachers primarily use?
 _____ Apple _____ Macintosh _____ IBM _____ other _____
- Check all that apply to indicate where these computers primarily for teachers are located.
- _____ classrooms: _____ each classroom _____ most classrooms _____ some classrooms _____ a few classrooms
 _____ school office
 _____ teachers' lounge
 _____ media center

___ other _____

3. Check _____ the chart to indicate location and numbers of technology hardware for student use.

	computer lab	typical classroom	media center
Example:			
Macintosh with CD-ROM	_____	_____	_____
printers – laser	_____	_____	_____
types of computers and number available	_____	_____	_____
Apple (Ile, Ile, GS)	_____	_____	_____
Macintosh without CD-ROM	_____	_____	_____
Macintosh with CD-ROM	_____	_____	_____
IBM Windows type without CD-ROM	_____	_____	_____
IBM Windows type with CD-ROM	_____	_____	_____
other _____	_____	_____	_____
printers – dot matrix	_____	_____	_____
printers – laser	_____	_____	_____
networked for printing	_____	_____	_____
networked for software	_____	_____	_____
Internet available	_____	_____	_____
World Wide Web available	_____	_____	_____
e-mail available	_____	_____	_____
CD-ROMs available	_____	_____	_____

4. Which type of computer do your students primarily use?

___ Apple ___ Macintosh ___ IBM ___ other _____

5. Check _____ all that apply to indicate if your school has these recent technologies.

	<u>Yes, for teachers' use</u>	<u>yes, for students' use</u>	<u>yes, in classrooms</u>	<u>yes, in Media Center</u>	<u>no</u>
digital cameras (ZapShot, Quickcam, etc.)	_____	_____	_____	_____	_____
CD-ROMs	_____	_____	_____	_____	_____
videodisc player connected to computer	_____	_____	_____	_____	_____
liquid crystal display for computer overhead	_____	_____	_____	_____	_____
Internet	_____	_____	_____	_____	_____
World Wide Web					

(Netscape, etc.)	_____	_____	_____	_____	_____
integrated learning system (ILS)	_____	_____	_____	_____	_____
e-mail	_____	_____	_____	_____	_____
voice mail for teachers classrooms	_____	_____	_____	_____	_____
scanner	_____	_____	_____	_____	_____
Zip drive	_____	_____	_____	_____	_____

6. List names of computer software (i.e. ClarisWorks, KidPix, etc.) typically used by students and by teachers for the following uses.

	Sixth grade	seventh grade	eighth grade
teachers			
word processing	_____	_____	_____
graphics	_____	_____	_____
database	_____	_____	_____
spreadsheet	_____	_____	_____
e-mail	_____	_____	_____
grading program	_____	_____	_____
frequently used educational software	_____	_____	_____

Your School Office's Technology

1. Check all that apply to indicate how the school office uses technology.

- ____ word processing (memos to teachers, letters to parents, meeting agendas, reports, etc.)
- ____ database (attendance, discipline records, mailing labels, scheduling, inventory, etc.)
- ____ spreadsheet (budgeting, grants, grading programs, supply orders, etc.)
- ____ desktop publishing (newsletters, student written publications, etc.)
- ____ electronic communication (in-building e-mail, district communications, etc.)
- ____ modem or network connection (for e-mail, Internet, WWW, etc.)
- ____ educational software (for preview, demonstration, recommendation to teachers, etc.)

Other School Technology

1. Does the media center have an electronic catalog? ____ yes ____ no
- Does the media center have electronic checkout? ____ yes ____ no

Does the media center have an electronic magazine index or database? ☐ yes ☐ no

2. Does the school use electronic record-keeping for any of these reasons?
 to keep track of skills mastered ☐ yes ☐ no
 to track individualized achievement (such as Accelerated Reader) ☐ yes ☐ no
 to create electronic portfolios or authentic assessment records ☐ yes ☐ no

Your School's Planning for Technology

1. Has your school been guided by a technology profile?
☐ yes date range of latest plan (19__ through 19__): attach a copy of the plan
☐ no skip to #4
2. Briefly describe how the technology plan was developed, if you know.
3. Who is responsible for implementing the technology plan? (Identify by position rather than personal name; example: elementary curriculum coordinator)
4. Have you used special funding for technology? Explain.
5. Does your school or district provide technology-related staff development? ☐ yes ☐ no
 If "yes" attach copy of staff development plan if available.
6. Does your school have a technology budget? ☐ yes ☐ no
 are funds provided for staff development activities? ☐ yes ☐ no
 are funds adequate for needed staff development? ☐ yes ☐ no
 approximate technology budget for this year \$ _____
 approximate technology-related staff development budget this year \$ _____
 approximate % of technology budget devoted to staff development _____%
11. List some of your school's future plans for technology.

Form completed by _____ position _____

Thank you for taking the time to provide this information.

Organizational Profile

1. Indicate the number of students in each grade in your school:
 _____6 _____7 _____8
2. List any special grade or classroom configurations (team teaching, shared teaching positions, lead teachers, etc.):
3. Number of teachers in your school: _____ Number of other staff in your school: _____
 Average years of experience of teachers: _____
 Range of years of experience of teachers: _____ highest _____ lowest
4. Principal's years in present position: _____
 Principal's years in other full-time administrative positions: _____
 Principal's years of full-time classroom teaching experience: _____
5. Describe how your school provides preparation time for the teachers.

How long has this method of preparation time been in effect? _____
 Are there any plans to change this method? ___ no ___ yes If "yes," explain below.

6. What kind of scheduling does your school's library media center use?
 _____ fixed scheduling (classes come to library media center on a scheduled, regular basis)
 _____ flexible scheduling (students and/or classes use the library media center when needed)
 _____ combination: describe below
7. How would you describe your students' access to technology facilities?
 _____ fixed scheduling (classes use technology on a scheduled, regular basis)
 _____ flexible scheduling (students and/or classes use technology when needed)
 _____ combination: describe below
8. Check ___ if your school or school district has used these funding sources for technology. Check ___ all that apply.
 _____ special technology tax levy
 _____ grant (granting institutions : organizations _____)
 _____ other special funding (describe: _____)
9. Does your school use some variation of shared decision-making (Site Council, Principal's Advisory Committee, etc.)? ___ no ___ yes

If "yes," explain system below.

If "yes," for how many years has this method been used at your school? ___ years

10. Does your school have a technology committee to help make decisions regarding technology?
 ___ no ___ yes

If "yes," answer these questions:

List members of the committee below.

How are members of the committee chosen?

What kinds of responsibilities does this committee have?

11. When was this school building built? _____

Has the use of technology affected the facility? ___ no ___ yes

If "yes," describe how the facility has been affected:

Are technology-related changes in the building anticipated for the near future? ___ no ___ yes

If "yes," explain anticipated changes:

12. If your school has the following instructional technologies, list the approximate date when our school purchased and or installed each.

Technology	date
computers with colored monitors	_____
computers with CD-ROM drives	_____
computer lab	_____
computer network	_____
Internet connection	_____
World Wide Web connection	_____
computer in every classroom	_____
voice mail system for classrooms	_____

form completed by _____ position _____

Appendix D

Questionnaire and Biographical Information

Interview Subject Biographical Information

1. name _____
2. current position _____
(teacher, administrator, etc.)
3. grade level (if appropriate) _____
4. number of years in current position (include this year) _____
5. number of years of teaching experience (include this year) _____
6. level of professional training
☐ BA/BS ☐ BA/BS+ ☐ MA/MS ☐ MA/MS+
 other _____
7. age range (at last birthday)
☐ 20-30 ☐ 31-40 ☐ 41-50 ☐ 51-60 ☐ 60+
8. gender ☐ male ☐ female
9. years of experience with computers (include this year)
☐ none ☐ 1-5 ☐ 6-10 ☐ 7-15 ☐ 15+

Appendix E

Forms

Nomination form

1. LOW-END USERS:

2. HIGH-END USERS:

CONTACT SUMMARY FORM

Contact type:

Site:

Visit: _____

Contact date:

Phone: _____

Today's date:

Written by:

Key PointsThemes

Participant Consent Form

University of Nevada, Las Vegas Department of Curriculum and Instruction

You are invited to participate in a research study being conducted for a doctoral study at the University of Nevada, Las Vegas. The purpose of this study is to determine what are the technology-related attitudes, behaviors, and skills that play a role in a school's technology program with emphasis on the school principal. You have been identified as an individual who can contribute to understanding the technology leadership at your school. Please read this form and ask any questions you may have before agreeing to participate in the study.

This study is being conducted by Alvin W. Matthews, a University of Nevada, Las Vegas doctoral student in Curriculum and Instruction in the Department of Education.

This study will employ a case study design with the researcher in the role of participant observer. Data will be collected through a questionnaire, formal and informal interviews, examination of pertinent documents, and observation. Your comments, experiences, and insights will serve as an important basis of this research. Length of involvement in the study is four months. No compensation will be given for participation.

All records and tapes of the interviews for this study will be kept confidential and remain with the researcher. Your real name will not be used. Research records will be kept in a locked filing cabinet in my home office and stored for a three-year period. Only the researcher will have access to any records. The study report and any other sort of report that might be published, will not include information that would make it possible to identify you or your school as a participant.

Your participation is voluntary. You are under no obligation to continue and you are free to withdraw your consent at any time. Your decision whether or not to participate will not affect current or future relations with the researcher. However, your participation is appreciated.

If you have questions later, you may reach Alvin W. Matthews at 799-3400 (days) or 631-7386 (evenings). The major advisors for this research are Dr. Randy Boone and Dr. Kendall Hartley (University of Nevada, Las Vegas). For questions about the rights of research participants, contact the Office of Sponsored Programs, 895-1357.

You will be given a copy of this form to keep for your records.

YOUR SIGNATURE BELOW WILL INDICATE THAT YOU HAVE DECIDED TO VOLUNTEER AS A RESEARCH PARTICIPANT AND THAT YOU HAVE READ THE INFORMATION PROVIDED ABOVE.

Signature _____ Date _____

Interviewer / researcher _____ Date _____

Appendix F

Coding

INITIAL CODING

1	PERSONAL SKILLS	24	Information Age	511	money
		241	social	512	time
11	technology skills	242	vocational	513	space/facility
111	computer experience	243	pedagogic	514	training
112	home computer	244	catalytic	515	positive attitude
113	access to internet	245	other	516	other
114	other technology				
		25	use with students	6	PLANNING
12	how learned	251	social		
121	undergrad courses	252	vocational	61	decisions
122	grad courses	253	pedagogic	611	comp every teacher
123	workshops	254	catalytic	612	building network
124	peers	255	other	613	Internet in classroom
125	students			614	email/communication
126	self-taught	26	reservations	615	technician hired
		261	Internet policies	616	coordinator hired
13	new technology	262	obsession with "new"	617	others
131	try it	263	"play with computer"		
132	get help	264	other	62	problems
133	read manuals			621	money
134	class	3	TECH LEADERSHIP	622	integration
135	watch			623	upgrading
136	other	31	roles	624	speed of change
		311	principal	625	training
2	REASONS FOR USE	312	comp specialist	626	human resources
		313	tech committee	627	attitudes
21	personal use	314	teachers	628	other
211	productivity tool	315	other		
212	professional "look"			7	IMPACT
213	communication	4	CLIMATE		
214	research	41	staff description	71	classroom instruction
215	efficiency	411	description	711	teacher role
216	others	412	rating	712	student role
		413	morale	713	cooperative groups
22	frustrations	414	other	714	structure
221	equipment failure			715	one comp classroom
222	rapid change	42	staff and technology	716	other
223	troubleshooting	421	description		
224	time to learn	422	rating	72	new teachers
225	other	423	growth/changes	721	hiring
		424	strengths	722	training
23	school's use	425	weaknesses	723	role as "expert"
231	social	426	other	724	other
232	vocational				

233	pedagogic	5	SUPPORT	73	school impact
234	catalytic			731	integration
235	other	51	admin support	732	schedule
				733	facility
				734	communication
				735	other

8 RESOURCES

81 budget

82 human resources

821 tech support

822 comp specialist

823 incentives

824 tech teacher

825 other

83 equity

831 school to school

832 teacher to teacher

833 conflict

834 gender

835 other

84 decision-making

841 shared

842 problems w/decisions

843 tech cmte decisions

85 problems

851 past problems

852 present problems

9 ADVICE

91 new principal

92 roles--present

921 leader

922 manager

923 politician

924 other

93 roles--future

931 leader
932 manager
933 politician
934 other

94 to new teacher
941 teaching style
942 learning styles
943 collaborate
944 “play” w/technology
945 tech is not everything
946 teachers have to learn
947 mentor relationships

Revised Coding

1	PERSONAL SKILLS	23	use of technology	413	morale
		231	social	414	other
11	technology skills	232	vocational		
111	computer experience	233	pedagogic	42	staff and tech
112	home computer	234	catalytic	421	description
113	access to Internet	235	other	422	rating
114	other technology	236	a tool	423	growth/changes
		237	sch off efficiency	424	strengths
12	how learned			425	weaknesses
121	undergrad courses	24	Information Age	426	other
122	grad courses	241	social		
123	workshops	242	vocational	5	SUPPORT
124	peers	243	pedagogic		
125	students	244	catalytic	51	admin support
126	self-taught	245	other	511	money
127	ed admin class	246	positive attitude	512	time
128	admin workshops			513	space/facility
129	teacher conference	25	use with students	514	training
		251	social	515	positive attitude
13	new technology	252	vocational	516	other
131	try it	253	pedagogic	517	decision-making
132	get help	254	catalytic	518	participate in training
133	read manuals	255	other		
134	class, workshop	256	positive attitude	52	support from principal
135	watch			521	money
136	other	26	reservations	522	time
137	projects to be done	261	Internet policies	523	space/facility
		262	obsession with "new"	524	training
2	REASONS	263	"play" with computers	525	positive attitude
		264	other	526	other
21	personal use	265	time	527	adding help position
211	productivity tool	266	dependence		
212	professional "look"			53	other needs from
	principal				
213	communication	3	TECH LEADERSHIP		
214	research			54	principal's role
215	efficiency	31	roles	541	leader
216	others	311	principal	542	manager
		312	comp specialist	543	politician
22	frustrations	313	tech committee	544	teacher
221	equipment failure	314	teachers	545	model
222	rapid change	315	other	546	encourager
223	troubleshooting			547	other
224	time to learn	4	CLIMATE	548	facilitator

225	other			549	situational
226	not used to potential	41	staff description	5410	hiring new teachers
227	too slow (equipment)	411	description	5411	know cutting edge
228	not enough computers	412	rating		
55	supp for tech leaders	72	new teachers	923	politician
551	conferences	721	hiring	924	other
552	school visits	722	training	925	teacher
		723	role as "expert"	926	advocate
		724	other	927	encourager
		73	school impact	93	roles--future
		731	curr integration	931	leader
		732	schedule	932	manager
		733	facility	933	politician
		734	communication	934	other
		735	other	935	teacher
		736	comp lab access	936	advocate
				937	encourager
		8	RESOURCES		
61	technology problems	81	budget adequacy	94	to new teacher
621	money			941	teaching style
622	curr integration	82	human resources	942	earning styles
623	upgrading	821	technical support	943	collaborate
624	speed of change	822	comp specialist	944	"play" w/technology
625	training	823	incentives	945	tech is not everything
626	human resources	824	technology teacher	946	teachers have to learn
627	attitudes	825	other		
628	other				
629	Internet policies	83	equity		
6210	integrate technology	831	school to school		
6211	classroom access	832	teacher to teacher		
6212	network problems	833	conflict		
6213	decision-making	834	gender		
6214	technical support	835	other		
		836	specialists		
62	tech training	837	spec ed students		
631	summer courses				
632	workshops	84	decision-making		
633	mentoring/coaching	841	shared-decision making		
634	tech committee	842	problems with decisions		
635	other	843	tech cmte decisions		
7	IMPACT	85	problems		

		851	past problems
71	classroom instruction	852	present problems
711	teacher role		
712	student role	86	other
713	cooperative groups		
714	structure	9	ADVICE
715	one comp/classroom		
716	other	91	to new principal
717	limitations of tech		
718	positive attitude	92	roles--present
719	keyboarding skills	921	leader
7110	spec ed uses	922	manager

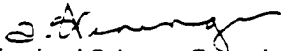
Appendix G
Human Subjects Protocol Approval

Human Subjects Protocol Approval



DATE: February 15, 2001

TO: Alvin Matthews
Curriculum & Instruction
M/S 3005

FROM: Dr. Fred Preston 
Chair, Social/Behavioral Sciences Committee
UNLV Institutional Review Board

RE: Status of Human Subject Protocol Entitled:
"Technology Leadership at a Junior High School: A Qualitative Case Study"

OPRS #311s0101-215

This memorandum is official notification that the protocol for the project referenced above has been reviewed by the Office for the Protection of Research Subjects and has been determined as having met the criteria for exemption from full review by the UNLV human subjects Institutional Review Board. In compliance with this determination of exemption from full review, this protocol is approved for a period of one year from the date of this notification and work on the project may proceed.

Should the use of human subjects described in this protocol continue beyond a year from the date of this notification, it will be necessary to request an extension.

If you have any questions or require assistance, please contact the Office for the Protection of Research Subjects at 895-2794.

cc: OPRS File

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