HOW BELIEFS ABOUT TEACHING AND LEARNING INFLUENCE THE TECHNOLOGY TRAINING EXPERIENCE: AN EXPLANATORY CASE STUDY

By

KEITH A. RESTINE

Bachelor of Science
New Mexico State University
Las Cruces, New Mexico
1978

Master of Arts
Eastern New Mexico University
Portales, New Mexico
1986

Specialist in Education
Western Kentucky University
Bowling Green, Kentucky
1992

Submitted to the Faculty of the Graduate College of the
Oklahoma State University in partial fulfillment
of the requirements for the Degree of
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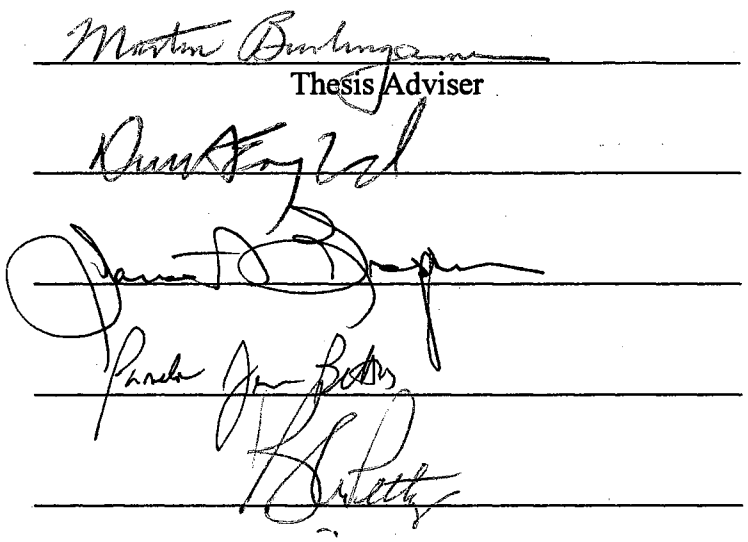

Thesis Adviser

Dean of the Graduate College

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CHAPTER I

INTRODUCTION TO THE STUDY

Logan (1995) suggests that "we are in the midst of a profound information revolution in which computer technology is changing the way we organize work and learn about our world. Knowledge, not capital, is the new source of wealth" (p. 1). Rapid advances in the communication and information industries are influencing the nature of work and organizational patterns in the workplace. Schools are one organization facing workplace changes due to increased technologies.

Accompanying the introduction of new hardware and software into schools is the realization that school personnel must develop technological expertise. Discussions emphasize effective technology training for teachers as paramount to the success of any school-based technology program (Office of Science and Technology Policy, 1997). Pappillion and Cellitti (1996) suggest traditional technology training methods fail to produce significant technology use in classrooms.

Cuban (1989) and others (e.g., Lieberman & Miller, 1992; Lortie, 1975) submit school workplaces are defined by the realities of educating large groups of students. Correspondingly, teaching culture reveals a practical knowledge base for handling the complexities of large group instruction. Cuban (1986) suggests that the introduction of technology into schools has not driven widespread change because "... altering pedagogy requires a change in what teachers believe" (p. 109).

Evidence indicates beliefs influence how teachers conduct the teaching process (Holt-Reynolds, 1992; Kagan 1992; Romanowski, 1997). Correspondingly, beliefs teachers hold about the realities of work life may be important in the adoption of technologies into the school (Honey & Moeller, 1990). The implementation of technologies into schools often includes increased technology training opportunities. Deeply held beliefs about teaching and learning may influence how teachers interpret the training experience.

The adoption of technologies into the daily practice of schooling involves a complex mixture of technical skills, core assumptions about the purposes of education, pedagogical and methodological issues, and beliefs about teaching and learning. Additionally, these dimensions must be viewed within the individual context of the particular training experience and work environment. The implementation of technology into the school may be more interrelated and complex than previously suggested.

Bruner (1996) emphasizes the impact that beliefs have on educational processes. Akbada and Kurubacak (1998) discuss improved understanding of teachers' beliefs and attitudes as critical to technological integration into the curriculum. Others (Dupagne & Krendl, 1992; Hannafin & Freeman, 1995) stress understanding beliefs about knowledge acquisition is important to adoption of technologies in schools.

This study will focus on how beliefs about teaching and learning influence technology training experiences. Specifically, this study will describe and analyze beliefs that teachers and trainers hold about teaching and learning. These beliefs will be analyzed from frames of reference used by teachers and trainers to determine the usefulness of training experiences to personal practice. This study of the influence of beliefs about

teaching and learning will be analyzed through a conceptual framework that uses one aspect of Mezirow's (1990,1994,1996, & 1997) transformational theory of adult learning combined with Elbaz's (1981) framework of teacher personal knowledge.

Background of the Study

The number of computers in American public schools increased over the past decade (Becker, 1993; O'Donnell, 1995). Akbada and Kurubacak (1999) discuss the minimal impact increased technologies exert on the integration of technologies into classrooms. O'Donnell (1995) provided a similar observation four years earlier. Lack of effective training for teachers in technology is identified as a primary contributor to this problem (Pappillion & Cellitti, 1999; Peck & Dorricot, 1994). Stasz (1984) and Stutzman (1981) reported similar concerns over a decade earlier.

A primary method to facilitate teacher learning in the workplace is some form of professional development activity. Although schools are providing technology training activities, teachers report feeling inadequately prepared to use computers in classrooms (Main & Roberts, 1990; Milner, 1990). O'Donnell (1995) states, "there is a serious lack of knowledge regarding what constitutes an effective staff development program for the integration of computers into the classroom" (p. 10).

Over thirty years ago, McLaughlin and Marsh (1978) suggested that technical skill use by teachers does not assure change in classroom practice. Fullan (1982, p. 257) believed that innovations must meet personally constructed tests of practicality, suggesting that "implementation will occur to the extent that each and every teacher has the opportunity to work out the meaning of the implementation in practice." Further,

Cuban (1986) advised that personally constructed tests of practicality are more important to teachers than exposure and training.

Aquila and Parrish (1989) posit that rejection of technology in classrooms reflects culture clash between the craft culture of teaching and a technical culture. Cuban (1986) discusses teaching culture that prizes practical pedagogy, emphasizes conservatism, and perpetuates current practices. Teachers selectively choose technologies to solve teacher-defined problems without minimizing classroom authority issues. Cuban (1986) states, "the folklore, occupational wisdom, norms, and daily teaching practice reinforce what is, rather than nourish technological innovation. Beliefs shaped by these teaching experiences strengthen the satisfactions derived from personal bonds with students and are a part of a teacher's unique perspective" (p. 60).

Lortie (1975) emphasizes the practical nature of teachers' beliefs by stating:

> This kind of socialization sequence leaves room for the emergence and reinforcement of idiosyncratic experience and personal synthesis. In neither structure nor content is it well suited to inoculating commonly held, empirically derived, and rigorously grounded practices and principles of pedagogy. The lessons taught by early yet persisting models rest on chance and personal preference; training in pedagogy does not seem to fundamentally alter earlier ideas about teaching. Teachers say that their principle teacher has been experience; they learned to teach through trial and error in the classroom. They portray the process as the acquisition of personally tested practices, not as the refinement and application of generally valid principles of instruction. They insist that influences from others are screened through personal conceptions and subjected to pragmatic trial. (pp.79-80)

Implementation effectiveness may be related to multiple factors. The interactions of factors within professional development experiences and beliefs of individual teachers may contribute to transfer of new attitudes, classroom practices, and the successful integration of an innovation into schools. One factor may be the unique individual

interpretations of the technological training experience. For example, exposure to technology training may be subject to many interpretations. If individual beliefs influence how teachers and trainers interpret meaning-making experiences in technology training settings, then better understanding of the influences of beliefs and interpretations of experience may be important.

Conceptual Framework

Qualitative methodologies attempt to understand phenomena holistically in order to provide a context for data. "The researcher strives to understand the gestalt, the totality, and the unifying nature of particular settings" (Patton, 1980, p. 40). The holistic study of phenomena may be aided by a mechanism to focus the study.

The use of a conceptual framework provides a lens through which to view the phenomena under study. Use of a framework allows the researcher to isolate and concentrate attention on specific areas for detailed study while retaining a holistic sense of the total phenomon. The conceptual framework used in this study (See Figure 1.1) illustrates the learner's frame of reference as one interpretive determinant used in identifying meaningful events and practices in technology exposure events. This frame of reference is situated within the specialized knowledge(s) possessed by teachers.

Mezirow (1990, 1994, 1996, & 1997) suggests that it is the unique world view, constructed by the learner, which determines learner-specific interpretations of events. The learner carries a unique frame of reference that contributes to event interpretation. Mezirow (1990) discusses psychocultural assumptions that define this frame as "habits of expectation."

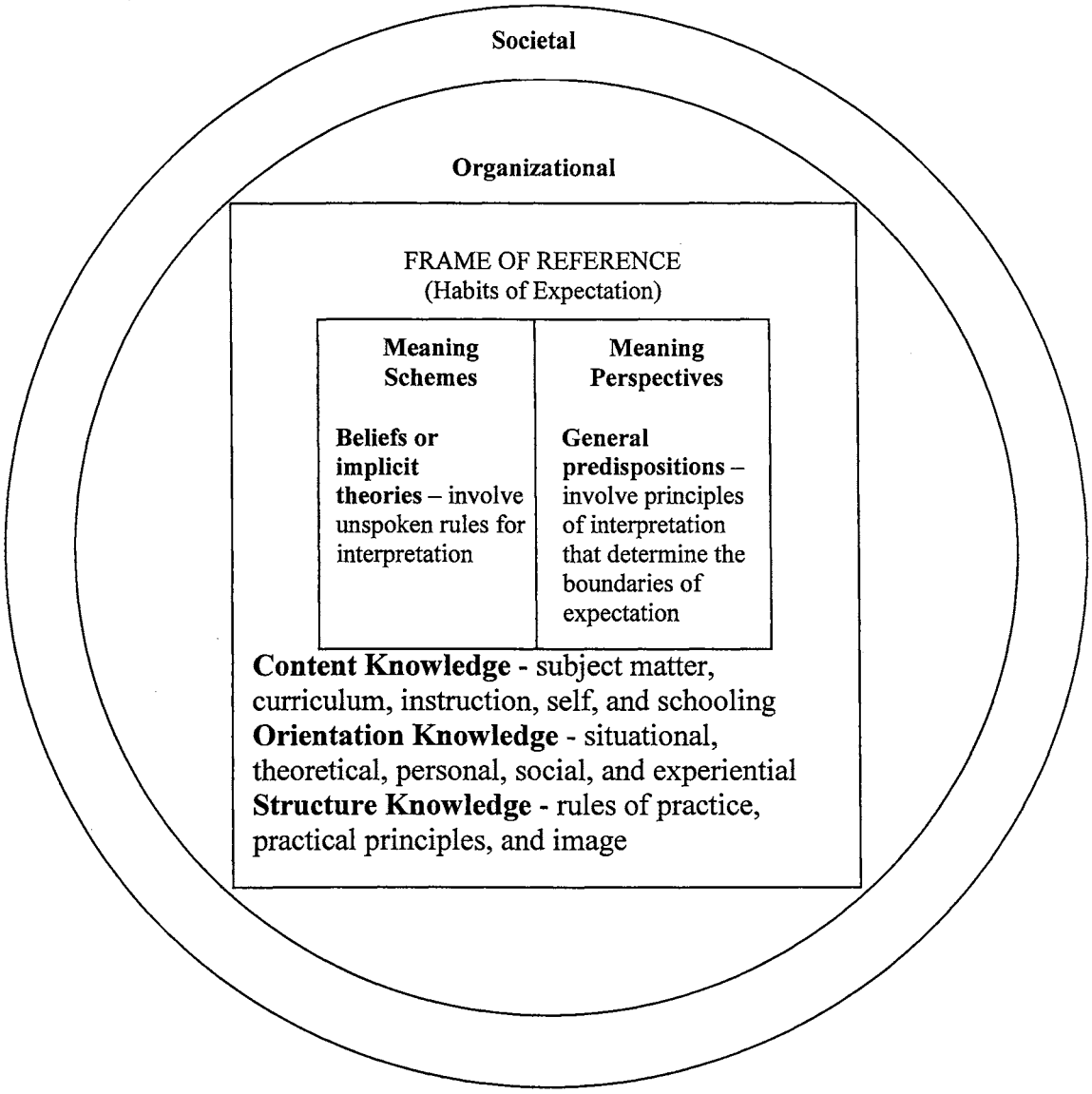


Figure 1.1 Mezirow's Framework Situated Within Teacher Personal Knowledge

Mezirow (1990, 1994, 1996, & 1997) distinguishes two dimensions within the frame of reference: meaning schemes and meaning perspectives. Meaning schemes are abstract expectations defined as "sets of related and habitual expectations governing if-then, cause-effect, and category relationships as well as event sequences" (Mezirow, 1990, p. 2). Schemes reflect implicit interpretation rules. Meaning perspectives are

composed of broad, general predispositions within which the learner interprets new experiences through analyzing previous experiences.

Learning, according to Mezirow, (1994, p. 223) is a "social process of construing and appropriating a new or revised interpretation of the meaning of one's experiences as a guide to action." Mezirow (1996) stated that learners "make meaning by projecting images and symbolic models, meaning schemes based upon prior learning, onto our sensory experiences and imaginatively use analogies to interpret new experience" (1996, p. 162).

This reference frame, personal and individualized, is also situated within a socio-cultural context. As such, it also has professionally and organizationally determined components. The study's individual component focus will be individual beliefs about teaching and learning teachers and trainers bring to learning situations. The professional belief system that teachers and trainers use to interpret technological events will be pedagogical beliefs that teachers are exposed to in teacher preparation programs and professional development activities. Since teachers and trainers work within an organization, organizational beliefs about learning are also in operation. Lastly, societal beliefs about learning are included since schools are affiliated within a local community and exist within a context of state and federal jurisdictions.

To further delineate Mezirow's assumption that learning is a matter of reinterpretation of previous events in relation to personal belief systems, this study will expand the conceptual framework to include work by Elbaz (1981) on teachers' personal knowledge. Including teachers' personal knowledge categories may provide additional interpretive power to analyze how beliefs influence technology training.

Elbaz (1981) proposes a framework to study the personal knowledge held by teachers based on school experiences and directed toward mediation of school-related problems. Elbaz divides the organization of practical knowledge into three areas: content, orientation, and structure. Content categories are concerned with areas where teachers have knowledge. Orientation categories delineate the types of knowledge held by teachers. Structure categories guide teachers' actions.

The content of practical knowledge resides in five categories: (1) subject matter, (2) curriculum, (3) instruction, (4) self, and (5) the milieu of schooling. Content knowledge is found in specialized subjects taught in school, the organization and structure of school-based curriculum, and in instructional issues. Additionally, teachers possess knowledge about schooling (i.e., social and environmental factors characterizing schools). Lastly, teachers possess powerful knowledge about their personality and self-image.

Orientations of practical knowledge are composed of five categories: (1) situational, (2) theoretical, (3) personal, (4) social, and (5) experiential. Situational knowledge is based on situational factors to create optimal teaching situations. Theoretical knowledge is general orientation to theory: (1) how teachers use theory, (2) how theories are selected, and (3) how knowledge is shaped by theory. Personal knowledge is the personally meaningful way teachers accept responsibility for classroom matters. Social knowledge delineates social conditions of teaching. Experiential knowledge focuses on the relationship between the way teachers understand the world of teaching and personal teaching style.

The structure of practical knowledge provides three rules of action to guide decision making. Rules of practice guide the methodical implementation of a teacher's purpose by establishing routines and processes to handle situations frequently encountered. Practical principles are broader categories based on past experiences that guide practice. Image showcases feelings, emotions, and beliefs that make known how teaching should be. Mental images guide thinking and metaphorical statements give shape and definition to images. Experience, theory, and educational folklore provide substance to this image of the mythical teacher and ideal teaching processes. Elbaz (1981) suggests that teachers use aspects of the framework to create optimized teaching situations or social settings.

The conceptual framework suggests that events are interpreted through a frame of reference. This frame uses beliefs and analysis in relation to past experiences as interpretive aids. The framework developed by Elbaz (1981) structures "teacher personal knowledge" into three categories. These categories: (1) content knowledge, (2) orientation knowledge, and (3) structure knowledge provide additional categories that serve to structure analysis. Professional beliefs, organizational beliefs and societal beliefs also influence the frame of reference.

Statement of the Problem

Introducing technology into school settings has generated complex issues. One such issue is the training of teachers to use technology in school settings. One area of interest is the design and development of effective training experiences that lead to implementation of technology in schools.

To understand factors that influence the effectiveness of training experiences, this study seeks to explore beliefs held by teachers and trainers about teaching and learning. The focus of the study is how personal beliefs, professional beliefs, organizational beliefs, and societal beliefs about teaching and learning influence the technology training experience. The problem, as defined for this study, is to explore, describe, and explain the underlying beliefs of teachers and trainers about teaching and learning that influence the technology training experience. Specific research questions to guide the study are: (1) How do personal, professional, organizational, and societal beliefs about teaching and learning influence teachers' (experienced users of technology, inexperienced users of technology, and technology trainers) interpretations of technology training experiences? (2) How do interacting beliefs about teaching and learning influence how teachers (experienced users, inexperienced users, and technology trainers) interpret technology training experiences? and (3) How do described similarities and differences in the beliefs of teachers (experienced users, inexperienced users) and trainers influence technology training experiences?

Significance of the Study

This study has significance for contributing to the research base, thereby contributing to improving practice and refining theory. This study should contribute to knowledge bases in instructional technology, professional education, educational administration, and professional development by describing beliefs held by teachers and trainers about teaching and learning. Events teachers and trainers identify as meaningful during technology training should also contribute to these knowledge bases. This study should impact practice by providing an initial line of inquiry about how beliefs influence

the interpretation of technology training. This study should contribute to theory by refining the conceptual framework from which to begin the search for methods to design technological experiences for teachers and trainers.

This study is significant for understanding teaching and learning in relation to technology training. Teachers involved in technology training and technology trainers possess beliefs about teaching and learning that influence the experience. Little research discusses teachers' and technology trainers' beliefs in relation to technology training. Exploring how teachers and trainers view beliefs about teaching and learning may inform theory, develop alternative practices in technology training, and add to the overall professional knowledge base.

Summary

Schools are pursuing technology training for teachers in order to provide teachers with technology skills. Successful implementation and integration of technology into schools is dependent upon numerous factors. High quality technology training may improve implementation. Understanding influences on the training experience should aid the development of training models for technology.

This study is an attempt to examine the influence of personal, professional, organizational, and societal beliefs on technology training experiences. An understanding of types of beliefs teachers and trainers of teachers hold about technology experiences will aid designers of training to provide meaningful and useful learning experiences for teachers.

Chapter II will present an overview of the literature base on teachers' beliefs, organizational beliefs, adult learning and development, and educational technology.

Chapter III will describe the methodology employed in this study. Emphasis will be given to the rationale for the method, selection of respondents, data collection and analysis, researcher bias, and issues of trustworthiness. Chapter IV will present the case study and Chapter V will present findings and analysis of the case. Chapter VI will present conclusions, implications, and recommendations.

CHAPTER II

REVIEW OF THE LITERATURE

This chapter provides a review of the literature on: (1) teachers' beliefs, (2) organizational beliefs, (3) adult learning and development, and (4) technology. The purpose of a review of literature is to examine the existing literature in these areas with the purpose of determining: (1) studies related to the problem, (2) research methods, strategies and instruments, and (3) relationship(s) to the interpretation of this study (Gay, 1996).

The section on teachers' beliefs establishes that numerous researchers discuss the influence of teachers' beliefs on practice. Sociocultural conditions of schools as workplaces are described in the section on organizational beliefs. Adult learning and development targets principles of adult development and learning to provide understanding of other fields influencing technology training. The section on technology focuses on the relationship of technology to schools and the relationship of training to implementation of technology.

Teacher's Beliefs

Research on teachers' beliefs provides a mixture of terms -- "practical knowledge" (Elbaz, 1981), "beliefs" (Horowitz, 1994; Romanowski, 1997), "personal practical knowledge" (Oberg, 1986), "personal constructs" (Siegel, 1978), "preconceptions" (Clark, 1988), "folk pedagogies" (Bruner, 1996), and "frames"

(Barnes, 1992). Regardless of the terms researchers have used to describe beliefs, evidence suggests internal reference points guide teacher action. It is suggested these reference points are based on individual interpretations of experiences in relation to personal beliefs, personal experiences, and unique work experiences carried by individuals.

As a result, teachers' beliefs are highly personal and context-specific, serving as interpretive filters. The personal, contextually-bound nature of beliefs insulates beliefs from change efforts (Brousseau, Book, & Byers, 1988). One person's belief about a particular subject may exist without conclusive evidence to convince another person of the truthfulness of the belief. What one individual determines is truth may not be truth to another. So, in this sense, beliefs are situated within the context of the self, rather than supported by external evidence. To the believer, what is known and believed constitutes what is known as truth (Combs, 1982; Smith & Sheppard, 1988; Van Manen, 1977).

Beliefs and Teaching

Research indicates teachers possess implicit beliefs about students (Clark, 1988), about teaching (Britzman, 1986), and about subject matter (Elbaz, 1981; Romanowski, 1997). These beliefs influence the practice of teaching (Barnes, 1992; Ross, Cornett, & McCutcheon, 1992). Clark and Peterson (1986) state, "a teachers' cognitive and other behaviors are guided by and made sense in relation to a personally held system of beliefs, values, and principles" (p. 286). Romanowski (1997) suggests teaching is loaded with explicit and implicit beliefs used as a framework to establish meaning.

The depths and degrees of influence beliefs exhibit over the teaching and learning process are more difficult to establish. Analysis of existing literature on teacher beliefs is

difficult because of variations in research design, selection of subjects, sample size, definition of terms, and methodological applications found throughout the literature. What follows is not intended as a comprehensive review of all literature on beliefs but rather a representative sample intended to illustrate salient points of a diverse literature base.

The wide range of research designs and methodologies used to describe and analyze teacher beliefs impede any consistency in interpretation. Design and methodological considerations include: (1) thinking aloud strategies (Peterson, Marx, & Clark, 1978), stimulated recall through use of video or audio tape recordings (Peterson & Clark 1978), teachers as researchers (Lambert, 1984), repertory grid techniques (Corporaal, 1991; Munby, 1982), clinical interviews (Bussis, Chittenden, & Amerel, 1976), autobiographical interviews (Powell, 1992), Q-sorts (Ignatovich, Cusick, & Ray, 1979), survey instruments and inventories (Brousseau, Book, & Byers, 1988), heuristic elicitation methods (Eisenhart, Shrum, Harding, & Cuthbert, 1988), and case studies (Elbaz, 1981; Lambert, 1984).

Subjects of these studies are varied in sample size and role. One extreme are single subject case studies (Elbaz, 1981; Janesick, 1979). The contrasting extreme is the study by Brousseau, Book, and Byers (1988) on eight hundred and sixty three teachers. The small sample studies have less than fifteen subjects (Janesick, 1977; Munby, 1982; Peterson & Clark 1978). Mid range samples range from sixteen to sixty subjects (Bussis, Chittenden, & Amerel, 1976; Fuller, 1969). Large samples contain more than sixty subjects (Corporaal, 1991: Ignatovich, Cusick, & Ray, 1979). Roles represented by research subjects include; elementary teachers (Bussis, Chittenden, & Amerel, 1976),

teachers of specialized subject matter (Elbaz, 1981), teachers and administrators (Ignatovich, Cusick, & Ray, 1979), students (Chan, Burtis, & Bueiter, 1997), preservice teachers (Corporaal, 1991), and student teachers (Fuller, 1969).

The importance of beliefs in teacher development can not be discounted. Pre-service teachers possess a large body of knowledge and well-defined definitions about teaching prior to participation in professional classes. Clark, Smith, Newby, and Cook (1985) and Hollingsworth (1989) suggest that a teaching repertoire is present in preservice teachers prior to formal training in pedagogy. Images about teachers appear to be firmly imprinted through exposure to multiple teaching styles and teaching episodes over years of pre-university education. Beliefs play a pivotal role in learning to teach, serving as filters for accepting or rejecting concepts, procedures and philosophies based on congruence with existing beliefs. During student teaching assignments, education theory informs only a small amount of pedagogical practice (Britzman, 1986). In a study of teacher collegial interactions, Zahorik (1987) reports teachers' beliefs are not changed significantly through exposure to research findings.

Teachers' beliefs are embedded in the social system of schools as well as within teachers themselves. Brousseau, Book, and Byers, (1988) through analysis of survey instruments completed by teachers, contend classroom experiences and "teaching culture" shape beliefs across school settings. Successful classroom experiences reinforce a teacher's personal belief in a personal teaching style. In a study analyzing two junior high English classrooms, Evertson and Weade (1989) assert beliefs equate with personal teaching style.

Beliefs may be used as models to promote understanding. Individuals use models as guides to make sense of experiences (Romanowski, 1997). Other researchers (Elbaz, 1981; Hollingsworth, 1989; Kagan, 1992; Munby, 1982) point to beliefs as a system to make meaning of experiences.

Husén and Postlethwaite (1994) emphasize that teachers possess professional knowledge characterized as tacit and intuitive. This knowledge is guided by beliefs and implicit theories. Researchers (Combs, 1982; Spear & Mocker, 1984; Spodek, 1988; Yonemura, 1986) suggest personal beliefs and knowledge are related. Yonemura (1986, p. 6) discusses the importance of beliefs to knowledge by stating, "practical knowledge is a guide for action, and it is important to recognize that it is underpinned by values and beliefs that, for better or worse, influence children's lives." Spodek (1988, p. 170) asserts, "teachers' practical knowledge should not be disregarded...it is derived from the experience of teachers and validated within the context of daily practice." Combs (1982, p. 39) states, "recent studies have demonstrated that what makes good teachers is not their knowledge or methods, but the beliefs teachers hold about students, themselves, their goals, purposes and the teaching task."

Dobson, Dobson, and Koetting (1985, p. 87) tie beliefs into teaching by stating, "teaching practices, whether consciously or unconsciously chosen, are expressions of beliefs held by teachers." Kagan (1992) asserts the absence of a professional knowledge base for teaching leads to dependence on beliefs. Lortie (1975) reports teaching lacks a technical culture and practices consistent with experience and personality are valued. Jackson (1968) suggests teachers justify teaching decisions based on emotions and intuitive feelings.

Much of the early (1970-1989) research on beliefs developed categories or groupings that serve as guides for thought about teaching and beliefs. These studies are situated within different contexts and spread over two decades; thus, variation is found in the categorization systems and research focus. The selected studies provide understanding of the variety of categorization systems developed through research.

Bussis, Chittenden, and Amarel (1976) developed four orientations characterizing belief systems. Teachers were found to possess: (1) strong curriculum priorities, or (2) attention to student needs and feelings, or (3) attention to student interests and choices, or (4) beliefs in social interaction. These researchers also suggested teachers exhibit tension between grade level or content specific knowledge and global, developmentally appropriate, and process oriented practices.

Munby (1982) used fourteen case studies and repertory grid techniques to demonstrate variation in teachers' implicit theories. Teachers were characterized as emphasizing: (1) student learning and developmental goals, or (2) student involvement, or (3) teacher control and authority, or (4) student needs and limitations, or (5) motivational factors.

Conners (1978) and Marland (1977), in studies about teacher thought processes, developed categories through stimulated recall interviews with elementary teachers. Conners (1978) lists three principles of practice: (1) suppressed emotion, (2) teacher authenticity, and (3) teacher self-monitoring. Additional pedagogical principles include: (1) cognitive linking, (2) integration, (3) closure, (4) general involvement, and (5) equality of treatment. Marland (1977) suggests five principles of practice:

(1) compensation, (2) strategic leniency, (3) power sharing, (4) progressive checking, and (5) suppressed emotions.

Eisenhart, Shrum, Harding, and Cuthbert (1988) in a study of student teachers using heuristic elicitation methodology advance three domains. The first domain is characterized as high responsibility, expertise and control. In this domain are beliefs emphasizing: (1) the teacher as creator of the educational environment, (2) the inviolability of the teacher's classroom, (3) visible student success as rewarding, and (4) activities that develop student enthusiasm and continued learning. The second domain is characterized as problematic responsibility, expertise and control. These beliefs emphasize: (1) sharing and cooperation with other teachers, (2) teaching success as a mysterious process, (3) student success as dependent of support from home, and (4) the frustration of the demands of teaching and low pay. The final domain is characterized as low responsibility, expertise and control. In this domain are beliefs emphasizing: (1) teachers lacking expertise in development of new curricular materials, and (2) frustration with the amount of non-instructional business that interferes with teaching.

The trend found in research from 1990 to the present reduces dependence upon categorization and moves toward holistic explanations of how beliefs influence teaching. Holt-Reynolds (1992) concludes preservice teachers carry lay theories of teaching and learning into university teacher education experiences. This study found preservice teachers "...developed attributional beliefs about what teacher behaviors were causal to the successes, failures, and memorable incidents in their personal histories as students" (Holt-Reynolds, 1992, p. 331).

Other studies in this area by Knowles and Holt-Reynolds (1991) conclude personally held images and memories of teaching are used to strategically filter new experiences. This study, like others, suggests preservice teachers choose practical, attributional arguments over pedagogical, theory-driven arguments.

Studies concerned with reading (Richardson, Anders, Tidwell, & Lloyd, 1991; Johnson, 1992) emphasize personally held theories and beliefs are reflected in classroom practice. These studies suggest teachers select instructional approaches reflecting personally held theories and beliefs about reading instruction.

Powell (1992) studied the influence of life experiences on the development of pedagogical constructs by comparing traditional and nontraditional preservice teachers' pedagogical constructs. Powell suggests that K-12 teachers serve as models to influence preconceptions of teaching for both groups. The power of previous work habits and work related problem solving strategies on the development of pedagogical constructs differ greatly between traditional and nontraditional preservice teachers.

Gardner (1991) presents an alternative belief system through discussion about intuitive theories of the physical and social world being formulated through a history of interactions with the world:

> Not derived from formal study or from any preexisting disciplines, these naïve, folk, or intuitive theories nonetheless achieve considerable potency; they come to color subsequent interpretations of persons, events, and concepts, within and outside of a formal schooling context. (p. 103)

Other researchers, often derisively, have labeled studies in this area as "folk psychology." Beliefs of this nature, when applied to teaching and learning are labeled "folk pedagogy." "Beliefs and assumptions about teaching, whether in a school or in any other context, are

a direct reflection of the beliefs and assumptions the teacher holds about the learner" (Bruner, 1996, p. 46).

Folk pedagogies hold tentative assumptions about children and learning. Bruner (1996, p. 63) states, "any choice of pedagogical practice implies a conception of the learner and may, in time, be adopted by him or her as the appropriate way of thinking about the learning process. For a choice of pedagogy inevitably communicates a conception of the learning process and the learner. Pedagogy is never innocent. It is a medium that carries its own message."

Investigations into teachers' beliefs have established little evidence to clarify beliefs about technology and technological users. Investigations into beliefs across different types of technology users are lacking. Studies that investigate commonalties and differences in beliefs about technology training are also underrepresented.

Organizational Beliefs

Many authors have advanced theories concerning the impact social and cultural factors have on learning, attributing complex relationships in areas of cognition, social interaction, communication, and comprehension to sociocultural factors (Brown, Collins, & Duguid, 1989; Freire, 1994; Rogoff, Malkin, & Gilbride, 1984; Wertsch, 1984; Winn, 1996). Since humans interact with others in numerous ways, difficulties arise in separating the interrelated nature of social and cultural aspects. For purposes of this section, cultural aspects will be discussed with the understanding social aspects of human behavior are also present within the larger group termed culture.

Ost (1989) identifies culture as "observable, socially transmitted patterns of behavior" (p. 163). Culture, according to Jarvis (1992), is seen as the shaping force

through which the social system influences the individual. Others view culture as a type of conceptual framework for organizing and understanding the world (Bruner, 1997; Cole & Wertsch, 1996).

Organizational Culture

Smaller groupings of culture have been identified. One type of sub-culture is found within organizations (Erickson, 1987; Schein, 1985). Organizational culture influences individuals due to the interrelated nature of individuals and organizations. Organizational culture is closely tied to interpretations group members give events and actions in organizations.

Numerous authors mention the importance of organizational values as influences of individual behavior (Bennis, 1985; Hersey & Blanchard, 1988; Peters & Waterman, 1982; Schein, 1985). Paterson, Purkey, and Parker (1985) and Schein (1985) add commonly shared beliefs, assumptions, and understandings as important characteristics of organizational culture. Schein (1985) defines organizational culture as a learned product of group experience comprised of two levels: the visible level comprised of organizational artifacts and creations and the espoused level made up of organizational values that guide organizational behavior. Organizational culture is intricately tied to explicit and implicit values and beliefs held by members about organizational matters, defining how an organization views itself and its environment. Deal and Kennedy (1982) discuss five elements of organizational culture: (1) external environment, (2) values that define standards of achievement, (3) heroes and heroines that personify cultural values, (4) rites and rituals as cultural routines, and (5) the cultural network as the primary communication system.

Schools and Organizational Culture

Cultural systems devise means to develop, exchange, and discuss knowledge (Mercer, 1992; Spear & Mocker, 1984). Formal and informal education systems systematically teach culture and, as organizations, schools possess unique cultures. Rossman, Corbett and Firestone (1987) define school culture as shared beliefs, assumptions, and values. School culture is seen as local phenomena, uniquely bound in context, yet reflecting larger societal contexts (Griffin, 1985; Sarason, 1990; Smylie, 1991). Wyner (1991) suggests "...in each school, teachers have their own workplace beliefs, values, traditions, and relationships that constitute the culture of teaching" (p.

school culture is comprised of norms and the sub-cultures: (1) ent culture, and (3) teacher culture. Goodlad (1984) asserts site hools to such a degree that no universal school culture exists. vances a model for viewing school culture as a conceptual framing reality. Bates (1986) discusses myths as cultural ituting the beliefs and assumptions identifying a specific sses the significance of school culture by stating:

> gives meaning to life. The beliefs, languages, rituals, ntions, courtesies, and artifacts - in short the cultural oup, are the resources from which the individual and e constructed. They provide the framework upon which ct their understanding of the world and of themselves. al baggage is factual. It is empirical, descriptive, and part of this cultural baggage, perhaps the greater part, is ncerned not with facts but with meaning, that is, the prescriptive rules, which provide the basis for action. (p. 262)

38 schools, Goodlad and associates (1984) collected data from more than twenty-seven thousand individuals and more than one thousand classrooms.

Teaching is characterized as emphasizing: (1) whole group instruction, (2) the teacher as the center of the classroom, (3) emotional neutrality, and (4) the constraint of time. Teachers work in environments characterized by: (1) isolation, (2) limited decision-making options, and (3) classroom autonomy. Content matter is "packaged, arrayed, presented, and tested" (p. 265) in a consistent manner. Students are socialized to accept the dominant role of the teacher and group instruction:

> Schools differ; schooling is everywhere very much the same. Schools differ in the way they conduct business and in the way the people in them relate to one another in conducting that business. But the business of schooling is everywhere very much the same.
>
> There are phenomena which together constitute schooling. These come together commonly in all schools, with only modest variations in the configurations. Consequently, there is a sameness about schools just as there is a sameness about post offices or hospitals. (Goodlad, 1984, p. 265)

Goodlad concluded observed differences in schools were manifested in how individuals coped with regularities of organizational life. Organizational differences were noted primarily in areas of academic orientation or emphasis.

Schools have general agreement about formal rules and norms of behavior. Students and teachers act according to general norms appropriate for each role and socialization appears to norm teachers and students into clearly defined roles. Students are ranked by status (academics, athletics, income, etc.) and by age-grade organizational systems. Teachers are ranked by subject area, seniority, reputation, and informal power structures. Handbooks for faculty and students reinforce formal rules and behavior structures. A formal chain of command, with clear role differences between students, teachers, and administrators exists. Schools tend to be hierarchically organized, with prominent top-down management practices. Ambiguous and conflicting goals are the rule

(Griffin, 1985; Lortie, 1975; Sarason, 1971). There are tensions between: (1) individual versus group development, (2) specific skill development and more general knowledge, (3) control versus curiosity, and (4) socialization versus education.

Although agreement exists on organizational and behavioral structures, issues of instruction are far more complex. Teachers, administrators, and university faculty present diverse solutions to common instructional problems. Teachers are socialized to respect the sanctity of the classroom. In school culture, direct criticisms of other teachers' instructional practices are taboo. Teachers' conversations center on trivial matters and issues of instruction are avoided (Lieberman & Miller, 1992). Talk tends to be pragmatic and practical, yet with a professional distance (Cusick, 1992). Faculty culture tends to center on ritualized griping (Lieberman & Miller, 1992).

Lortie (1975), in a pivotal sociological analysis of teachers, used ninety-four interviews of teachers differentiated by income and grade level and discovered private teaching behaviors characterize teaching. He suggests schools may be "...organized around teacher separation rather than teacher interdependence" (p. 14). The cellular organization of schools limits interpersonal exchanges between teachers, creating a sense of professional isolation (Kidder, 1989).

Teaching becomes a private routine between teachers and students, developed through trial and error (Griffin, 1985, Lortie, 1975). Experience is viewed as the most important factor in learning to teach. Teachers, through individualized and isolated learning structures, lean heavily on the varied techniques that have worked for them in the past (Lieberman & Miller, 1992). Years of observing other teachers also provide templates for teachers to use. Lortie (1975) discovered that "training in pedagogy does

not seem to fundamentally alter earlier ideas about teaching" (p. 79). The individual nature of teaching supports a type of conservatism that may account for the slow change in modes of instruction and the daily conduct of schooling.

Teachers rate informal information exchanges with other teachers as superior to formal supervisory practices in shaping instruction (Cusick, 1992; Kidder, 1989). Sarason (1971) and Lortie (1975) suggest teachers may not value administrators as being experts in teaching. Teachers are selective when choosing peer ideas and adapting ideas to their personal teaching style. Selectiveness becomes a practical control mechanism for teachers.

Teachers use whatever works with a particular group of students. "To be practical means to concentrate on products and processes; to draw on experience rather than research; to be short-range and not predictive in thinking or planning" (Lieberman & Miller, 1992, p. 8). Cusick (1992) suggests all teachers create and use their own curriculum.

Teachers use control tactics to manage students (Cusick, 1992). Teacher-presented lecture and class work on written assignments are frequently observed (Goodlad, 1984; Sirotnik, 1983). Classroom control is attended to during most of the day, ranging from socialization to coercion to intimidation. Teachers direct the complexity of multiple interactions to concentrate on interactions keeping teachers at the center of control (Cusick, 1992; Jackson, 1968).

Waller (1932) suggests school is a cultural conflict between students and teachers. Schools possess rituals, folkways, ceremonies, mores, and sanctions supporting unique cultures. The primary issues are dominance and subordination. Waller (1932)

recommends social distance between teacher and students, creating stability in the social organization of schools.

Jackson (1968) characterizes schools as standardized environments exhibiting a high degree of stability. Classrooms are complicated, exhibiting 200-300 interactions per hour. Multiple and conflicting demands are norms for teachers. Jackson interviewed fifty teachers identified by administrators as "outstanding." These interviews emphasized: (1) immediacy, (2) intuitive gauges for understanding, (3) spontaneity, (4) absence of technical vocabulary, and (5) emotional investment by teachers. Classroom autonomy, freedom from undue evaluation, and development of an informal teaching style are noted (Jackson, 1968).

Sarason (1971), in a study of the introduction of a mathematics curriculum, suggests most teachers teach in the same manner that they were taught, emphasizing routines characterizing school life. Teachers are described as having relative autonomy in the classroom. Problematic to the world of the teacher are curricular constraints exacerbated by time constraints.

The quality of teaching observed in schools is "unremarkable" or even "flat, unimaginative, and uniform" (Bishop, 1990, p. 362). Goodlad (1984) characterizes classrooms as teacher directed, where teachers talk two-thirds of the time. Minimal corrective feedback is provided to students during the course of the day. Questions are infrequently asked or are closed questions without much complexity. Instruction is group-oriented with little variation and little emotional affect (Goodlad, 1984).

School culture is listed as one of many reasons for school success by some researchers (MacKenzie, 1983; Purkey & Smith, 1983). Maxine Green (1991) discusses

the power of culture by stating, "We are, after all, functions of a culture; most of those teaching in public schools speak the same language. The realities we construct -- schools...time clocks, running tracks... -- mean what they mean because we have internalized common ways of thinking about them and talking about them" (p. 4).

Brown et al, (1989) argue that one function of schools is the transfer of abstract, decontextualized concepts. Schools perpetuate the culture of school and do not reflect the larger culture. "School activity too often tends to be hybrid, implicitly framed by one culture, but explicitly attributed to another" (Brown et al, 1989, p. 25). School culture suspends intuitive, negotiated meanings situated within the context of everyday life and replaces it with narrowly defined problems, decontextualized definitions, and artificial activity. "The chief subject matter of school, viewed culturally, is school itself" (Bruner, 1996, p. 28).

School culture demonstrates remarkable similarities across sites and across time. Observations by Waller (1932), Lortie (1975) and Lieberman and Miller (1992) reflect many of the same phenomena. The culture of schools emphasizes pragmatism, practicality, privatization, socialization, and control. Characteristics of school culture are well documented but few studies include the introduction of technology. Beliefs attributed to the power of school culture are difficult to separate from the characteristics mentioned above. Yet, little investigation has targeted the intersection of beliefs, school culture, and technology. Understanding of the culture of schools may contribute to understanding of the beliefs that teachers hold about teaching, learning, and technology.

Adult Learning and Development

Adult education recognizes knowledge is rooted in experience. Michelson (1996) states knowledge is used to "connote a socially-constructed understanding of the world" (p. 187). John Dewey (1938) termed knowledge the "organic connection between education and personal experience" (p. 25). Contemporary theory suggests knowledge contributes to experience and experience contributes to knowledge. Experience used to organize meaning can not be separated from experience (Michelson, 1996).

Models and Theories of Adult Learning and Development

Phase and stage theories dominate the study of adult development, providing explanations for adult motivation, personal choice, and self-determination. These theories focus on stages or phases of life cycles of adults. Experts in the study of adulthood express caution about the use of generalizations to characterize life periods (Hayslip & Panek, 1993). Adult development is a continuous process and not easily adaptable to discrete stages and/or events.

Age-related cycles in adult development theory attempt to describe "life tasks or conflicts that stimulate growth" (Levine, 1989, p. 57). Patterns or significant periods of adult growth, transition, stabilization, and decline occur at certain times in the adult life cycle. Levine (1989) suggests patterns exist to define developmental phases and growth occurs through interaction between individuals and the environment. Levinson (1986) emphasizes major life tasks of men, and Erickson (1968) focuses on conflicts in specific stages of the life cycle. Other age-related theorists (Gould, 1972, Sheehy, 1976) use developmental tasks for classification.

In general, age theorists suggest adults in their 20's experiment with adulthood to develop what Levinson (1986) terms "a life structure" characterized by initial commitments. From the late 20's to the early 30's redefinition of earlier commitments and reassessment of initial pursuits characterize a transitional period. Later, the individual stabilizes and begins to set long-term goals to establish oneself as an individual. In the early 40's, another transitional period questions priorities and pursuits. Restabilization occurs in the mid 40's, characterized by a reinvestment in relationships. This pattern of transition and restabilization continues until death (Oja, 1991).

Erickson (1968) notes eight distinct phases from infancy to old age. Three major conflicts of adulthood are: intimacy versus isolation, generativity versus self-absorption, and integrity versus despair. Resolution of each conflict results in capacities such as love, caring, and wisdom. Erickson emphasizes three distinct periods of growth and not a single static period.

Although Levinson (1978) primarily concentrated on early and middle adulthood, he divides the life cycle into four twenty-five year phases. Transition, entry, age-specific transition, and culmination characterize each phase. Transitions are periods of instability and uncertainty, culminating in reassessments and directional changes. Levinson ascribes specific ages and work to be accomplished for each developmental period. In general, early adulthood is characterized by forming a dream and mediating between self and society. Midlife is characterized by the pursuit of balance and work plays a significant role in self-image issues. Late adulthood focuses on retirement and health issues.

Phase theories offer one explanation to understand adult behavior more fully. Specific phases of adult development are identified, and the transitional nature of adult

experience is emphasized. These theories provide a framework for understanding the ebb and flow of adult phases.

Stage theories help understand how individuals respond to developmental issues. The individual's worldview determines stages by influencing the reference point that individuals use for interpretation. Stage theorists contend human development is the result of changes in cognitive structures. "Development involves progression through an invariant sequence of hierarchically organized stages. Each new stage incorporates and transforms the structures of the previous stages and paves the way for the next stage" (Oja, 1991, p. 41). Movement between frames alters the lenses through which to view the world.

Stage theories differ from phase theories by not using age as the primary descriptor. Both views agree adult development is sequential, suggest adults seek understanding of development issues, and adults actively contribute to personal growth. Stage theories concentrate on "the structures and processes of human development" (Levine, 1989, p. 114). Two significant stage theorists are Lawrence Kohlberg and Jane Loevinger.

Kohlberg (1984) presents a framework for understanding moral development by establishing distinct stages. The hierarchical nature and linear progression from stage to stage is evident throughout the framework. He identifies three levels of moral thought: the preconventional level, the conventional level, and the postconventional level. Movement through the levels demonstrates a move from an ego orientation to a social orientation to a moral orientation.

Loevinger's (1976) work is based on ego level development, featuring the ego as a meaning-making structure dependent upon social interaction. Levine (1989) presents Loevinger's seven stages characterized by milestones of ego development. These stages are:

1. Self-protective (externalization issues)
2. Conformist (compliance issues)
3. Conscientious - conformist (self-awareness issues)
4. Conscientious (critical self-awareness of self and others)
5. Individualistic (increased tolerance of self and others)
6. Autonomous (self-realization)
7. Integrated (self-actualization).

Adults and Education

Regardless of the model of development, a reoccurring theme in adult studies is education. Cross (1981) states, "education is good and that the goal of the learning society is to maximize educational participation" (p. 32). Adult learners range from self-directed learners to degree pursuing adults in traditional and nontraditional programs.

Many authors list characteristics of adult learners (Brookfield, 1986; Lenz, 1982; Smith, 1982) while others discuss characteristics of adult learning programs (Knowles, 1984; Lenz, 1982; Orlich, 1989). Smith (1982) provides some characteristics about adult learners that exemplify thought about them: (1) different orientations to education and learning, (2) accumulation of experience, (3) identified developmental trends, and (4) anxiety and ambivalence.

One distinguishing element of adult education is experiential learning. Adults possess a wealth of experience that serves as a resource for further learning. Knowles (1984) suggests experience is key to adult learning, shaping new learning by interaction with previous experience. Previous experience shapes the knowledge base and forms the

basis for self-actualization. Dewey (1938) also stressed the importance of experience to successful educational practices.

Literature in the adult learning and development field suggests adults bring specific orientations into learning situations. Consideration of these different orientations brings richness to learning experiences. Adult development levels and learning orientations may contribute to the beliefs that teachers hold about teaching and learning.

Professional Development for Teachers

Systematic education/ reeducation of school employees has been called "in-service education" (Bacharach, Bauer, & Shedd, 1986; Neil, 1985; Tillman, 1985), "staff development" (Orlich, 1989; Wu, 1987), and "professional development." Guskey (1986) provides a general definition as "any systematic attempt to bring about change -- change in the classroom practices of teachers, change in their beliefs and attitudes, and change in the learning outcomes of students" (p. 5). Orlich (1989) emphasizes characteristics such as: (1) based on identified needs, (2) collaboratively planned and designed for identified groups, (3) designed with specific learning objectives and activities, (4) designed to improve job-related skills, and (5) paid for by the employer.

Wideen (1987) emphasizes the process of educating teachers has shifted in emphasis from single workshops on a variety of topics to more focused methods. Emphasis from performance improvement efforts of early workshops to a thorough understanding of teacher tasks and the world of schools is seen in today's staff development efforts.

The National Educational Goals Panel (1995) suggests that professional development is "...continuous, sustainable, site-based, context-driven, focused on student

learning and designed to promote school-wide innovation and change" (p. 3). This group indicates the success of reform efforts rests "upon teachers acquiring the skills, perspectives, and knowledge necessary to transform the learning of K-12 students" (p. 1).

The history of the effectiveness of professional development activities in American schools paints a dim view of what early staff development hoped to accomplish. Few reports demonstrate concrete indicators of effectiveness (Bacharach, et al, 1986; National Education Goals Panel, 1995; Wade, 1984/1985). McLaughlin and Marsh (1978) in a comprehensive study of federally funded projects identified effective and ineffective practices. Effective project management practices were: (1) use of concrete, teacher-specific, extended training, (2) use of direct classroom assistance, (3) provision for teacher observation of similar projects, (4) teacher participation in project discussions, and (5) administrator participation in training.

Leithwood (1990) identifies six stages of professional development typically found in schools. These are:

1. Development of survival skills
2. Gain competency in basic skills
3. Development of a tolerance for ambiguity
4. Development of the ability to construct effective applications
5. Assist colleagues to gain experience
6. Become instructional leaders.

Moore (1988) developed and tested several staff development practices via a faculty development project with collegiate faculty. Findings indicate faculty development is enhanced by:

1. A climate of respect and support
2. Experiences that include a collaborative mode
3. Programs that capitalize on learners' experiences
4. Experiences that foster participation and aid learners to achieve self-direction

5. Programs that encourage critical, reflective thinking
6. Programs that encourage problem posing and problem solving.

McLaughlin and Marsh (1978) and Guskey (1986) suggest professional development activities be related to ongoing classroom activities and take a practical orientation. Teachers want specific, practical ideas that can be directly implemented in the classroom setting (Guskey, 1986; Wade, 1984/ 1985). "Staff development activities undertaken in isolation from teachers' day-to-day responsibilities seldom had much impact" (McLaughlin & Marsh, 1978, p. 88).

McLaughlin and Marsh (1978) report skill-specific training produces a transient effect only. Teachers participate in a "mechanistic implementation" without assimilation of project concepts. Fullan and Pomfret (1977) suggest innovations often fail to be implemented at the classroom level for similar reasons. According to Lortie (1975) and Tillman (1985), teachers are reluctant to implement new strategies unless they are sure they understand the personal implications. Training is a type of information transfer but implementation is a process of mutual adaptation whereby teachers modify practice to meet project goals and the project adapts to the daily reality of schools (McLaughlin & Marsh, 1978).

McLaughlin and Marsh (1978) also advance the idea that more experienced teachers were less likely to change practice. Even when presented with evidence, teachers do not easily abandon personal classroom practices forged in the reality of classrooms (Bolster, 1983). The professional development needs of experienced teachers differ from those of novices, and Lortie (1975) indicates older teachers shift energies from the classroom to out of school interests or family responsibilities.

Characteristics of Professional Development and Adult Learning

Models of professional development programs fall into three primary categories (Husén & Postlethwaite, 1994). Skill development models are concerned with introduction and development of new skills. Reflective models build on teachers' experience and encourage reflective practices to bring about change. Project-based models are characterized by individual and collaborative work on specific projects.

McLaughlin and Marsh (1978) characterize professional learning as a "long-term, nonlinear process" (p. 88) and list five general assumptions about professional learning:

1. Teachers possess important clinical expertise
2. Professional learning is adaptive and heuristic
3. Professional learning is long-term and nonlinear
4. Professional learning must be tied to school-site program-building efforts
5. Professional learning is critically influenced by organizational factors in the school site and in the district. (p. 91)

Many authors list characteristics of staff development programs (Wood, Killian, McQuarrie, & Thompson, 1993; Wu, 1987). Ismat Abdal- Haqq, (1995, p. 2) provides the following characteristics of effective staff development:

1. Is ongoing;
2. Includes training, practice, feedback, reflection , and follow-up procedures;
3. Is school-based and embedded in teacher work;
4. Is collaborative;
5. Focuses on student learning;
6. Is rooted in the knowledge base of teaching;
7. Incorporates constructivist approaches;
8. Recognizes teachers as adult learners and professionals;
9. Provides adequate time;
10. Is accessible and inclusive.

Knowles (1984) concludes adult learners are different from young learners, and for learning to be effective the learning experience should: (1) be structured so the need

to know coincides with training, (2) provide an opportunity for application of learning, and (3) provide independently structured options for learners. Wu (1987) cautions that approaches to staff development should include both adult learning theory and growth oriented perspectives. Successful staff development activities should include: (1) teachers as consultants, (2) active participation, (3) practical content, (4) classroom application, and (5) understanding of resource and time limitations.

Smylie and Conyers (1991) suggest professional development activities reflect a move to competency-based programs focused on analytical and reflective types of learning. Such learning would be cooperative in nature and tailored for specific needs at specific sites. Further, Husén and Postlethwaite (1994) suggest successful staff development programs are characterized by: (1) common goals, (2) high expectations, (3) strong collegial interactions and leadership, (4) priority on continuous improvement, (5) formal and informal monitoring, and (6) appropriate uses of knowledge, expertise, and resources.

Theories of adult learning and development cluster into phase, stage, or age theories. A common theme with adult development is concern for ongoing education and self-directed growth activities. The adult education experience for teachers is some sort of professional development activity. This section demonstrated the change in professional development activities from competency-based approaches to growth-oriented perspectives. This section summarized characteristics of professional development programs, but few studies indicated distinct training suggestions for technology. The connection between the field of professional development and technology training is not readily apparent.

Instructional Technology

A comprehensive definition for technology is difficult due to disagreement in the field about the best definition. Definitions focus on processes or concentrate on equipment (Ely, 1997). Technology is defined as a delivery system comprised of equipment by some authors while others define technology as a systematic process of problem solving through the use of scientific processes.

Technology, in some form, has always been part of the school (Mehlinger, 1996). A historical perspective of technologies in school might include: slate chalkboards, inkwells, pen nibs, pencils, textbooks, radio, films, television, overhead projectors, video cameras, teaching machines, and desktop computers. Mehlinger (1996) states, "until recently the technology employed was rather simple and changed slowly" (p. 400).

Accurate estimates of the availability and use of technology are difficult to verify. The 1997 Digest of Educational Statistics (U.S. Government Printing Office, 1997) reports computer use in the workplace is commonplace. In 1993, computers were used by 46 percent of all workers on the job. Use was identified as more frequent in relation to level of education and level of salary (i.e., 10 percent of high school dropouts used computers in the workplace compared to 71 percent of those with master's degrees). Teachers were less likely to use computers than managerial or professional occupations. The average public school contained 75 computers in 1995. Internet access increased rapidly for schools from 35 percent in 1994 to 65 percent in 1996. Access was limited, with only 14 percent of classrooms having Internet access in 1996. Elementary students used computers more than other students. Students in families with higher incomes were

more likely to use computers at home and to use computers for schoolwork (U.S. Government Printing Office, 1997).

Effectiveness of Instructional Technology

Although hundreds of studies on technology and instruction have been conducted, they present mixed results. Some studies make strong cases for the effectiveness of instructional technology while other studies present mixed results or proclaim little or no instructional advantage.

Research indicates that technology makes a difference in student achievement levels (Beyer & Dusewicz, 1991; Mergendoller, Stoddart, & Horan, 1993), student attitudes (Beyer & Dusewicz, 1991; Johnson & Vaughn, 1992), student motivation (Berg, Benz, Lasley & Raisch, 1997), student writing abilities (Anstendig & Meyer; 1997), teaching practices (Berg, Benz, Lasley & Raisch, 1997; Guthrie & Rosenzweig; 1997), student/ teacher interactions (Omoregie & Coleman, 1997), and teachers' beliefs (Honey & Moeller, 1990). Neutral or contradictory research also exists to suggest that all introductions of technology do not make profound or lasting changes. For example, in a large-scale study of Integrated Learning Systems in the New York City Schools (Office of Educational Research, 1995) no significant difference was noted between students exposed to ILS and students who did not receive ILS training. A single case study of one elementary classroom (Oliver, Malm, Malone, Nay, Sauners, & Thompson, 1997) suggests results about the effectiveness of technology were inconclusive.

Education has not embraced technology to the same degree as the business community has embraced it. Education has been resistant to implementation of technology (Kerr, 1991), and adoption has been haphazard, with core elements of schools

remaining essentially unchanged (Peck & Dorricott, 1994). Schools reflect functions and traditions that have been part of education experiences for years. Technology has not traditionally been part of that experience. Business has been transformed through common acceptance of computers into business environments. If business lost computers tomorrow, the ways and means business could and would be conducted would be radically transformed. If schools lost computers tomorrow, little change would be noted in day-to-day activities of schools.

Debate concerning relative merits of instructional use of computers has raged since the introduction of computers into schools. Better known examples of these arguments include Clark's (1983) assertion media are delivery equipment and not influences on student achievement. Clark (1985) conducted a meta-analysis of computer-based instruction studies and found confounding effects in many studies. Changes in performance were attributed to uncontrolled variables (i.e., instructional methods, content, or novelty) and methodological problems. Kulik and Kulik (1987) conducted a meta-analysis of more than 200 studies on computer-based instruction and concluded students using this method had: (1) better test scores, (2) better attitudes toward learning, and (3) required less instructional time than students using traditional methods. A contemporary meta-analysis of 36 studies suggests instructional use of computers has significant effect on student academic achievement across all grade levels included in the studies (Khalili & Shashaani, 1994).

Authors who criticize research on instructional technology (Glenna & Melmed, 1996; Riel, 1993) suggest numerous reasons research has been insufficient in documenting the effectiveness of educational technology:

1. Research has examined performance on lower order tasks and basic skills
2. Tests do not measure outcomes being sought
3. Reports are anecdotal in nature or program testimonials
4. School districts lack expertise to conduct accurate studies
5. Proponents of new programs protect programs from scrutiny
6. Assessments of technology are assessments of instructional processes
7. Vendors reject comprehensive evaluations
8. Educational leaders do not base decisions on research
9. Technology is seen as equipment.

The Software Publishers Association presents a positive view about technology's effectiveness in schools. SPA commissioned an independent consulting firm, Interactive Educational Systems Design, Inc., to review research on educational technology. The latest report (1995) is based on 176 research reviews and reports from 1990 to 1995. Salient points from this review include:

1. Educational technology has positive effects on student achievement in all subject areas, in all grade levels, and in various types of classrooms
2. Educational technology has positive impacts on student attitudes toward learning and student self-concept
3. Student characteristics, design of instruction, role of teachers, student grouping patterns and level of access to technology impact the effectiveness of educational technology
4. Technology in schools encourages student-centered, cooperatively grouped classrooms
5. Technology in schools encourages increased interactions between students and teachers
6. Learning environment characteristics maximize benefits of educational technology
7. Positive changes in the learning environment, due to the introduction of technology, evolve slowly.

Kulik and Kulik (1991) investigated the effectiveness of self-paced instructional software and found software of this type improved speed of learning and achievement by twenty percent over traditional methods of instruction.

A five year, large-scale longitudinal study of nine Florida elementary schools was conducted from 1987 to 1993. Over 1,400 students participated in the (CHILD) Computers Helping Instruction and Learning Development project. Gains in standardized achievement data were found to be statistically significant across grades, schools, and subjects. Strength of effect size demonstrates a relationship to length of participation in the program (Butzin, 1991).

In 1986 Apple Computer, Inc., initiated a long-term project named Apple Classrooms of Tomorrow (ACOT) with seven classrooms representing a sample of public schools. The ACOT project provides evidence immersion in technologically rich environments benefits academic and social goals in schools. Perhaps more importantly, researchers documented changes in classroom structures and interactions. Teachers were teaching differently, and students were learning differently (Dwyer, 1994). The ACOT report states that participating students:

1. Explored and represented information dynamically
2. Became more socially aware
3. Increased self concept
4. Communicated effectively
5. Demonstrated independent learning strategies
6. Demonstrated collaborative strategies
7. Know personal areas of expertise and shared expertise spontaneously
8. Used technology appropriately
9. Demonstrated routine use of technology.

Observational data collected during the study indicated the learning culture changed. For students, changes were noted in the way students organized and solved problems. For teachers, changes were noted in interaction patterns with students and modifications of teaching philosophies (Dwyer, 1994).

The relative degree of effectiveness mentioned in studies is difficult to establish because of wide variations in research designs and methodologies. The following examples are showcased as representative samples to provide an illustration of the diverse nature of literature found under educational technology descriptors.

The research designs and methodologies used to describe and analyze technology in schools are varied enough to make combining techniques difficult. Design and methodological considerations include: (1) survey instruments (Beyer & Dusewicz, 1991; Berg, Benz, Lasley, & Raisch, 1997), questionnaires (Omoregie & Coleman, 1997), standardized test data (Mergendoller, Stoddart, & Horan, 1993), student work examples (Mergendoller, Stoddart, & Horan, 1993), interviews (Carey & Sale, 1997; Gunn, 1997), case study (Anstendig & Meyer; 1997), journals (Niess & Merickel, 1997), content analysis of e-mail (Burgstahler, Baker, & Cronheim, 1997; Fryatt & Gregg, 1997), and content analysis of web pages (Barron & Ivers, 1997).

Subjects differ in the nature of respondent(s) and in size of unit of analysis. The smallest samples were single case studies, ranging from single classrooms to single schools or districts (Hurst, 1994; Oliver, Malm, Malone, Nay, Sauners, & Thompson, 1997). Multi-site studies were slightly larger, such as the study by Beyer and Dusewicz (1991) that included three sites in three states. Studies of specialized populations (i.e., student teachers, students with disabilities, etc.) were larger, ranging from six student teachers and supervising teachers (Casey, 1997) to fourteen case studies of disabled students (Carey & Sale, 1997). Survey-based research or questionnaire-based research had the largest sample sizes: thirty Chicago teachers (Berry, 1994), 224 teachers (Pan & Zbkewski, 1997), 317 college students (Gunter & Gunter, 1994). Subject roles

represented by research included teachers (Pan & Zbkewski, 1997), teachers identified as exemplary computer users (Berg, Benz, Lasley & Raisch, 1997), state technology projects (Mergendoller, Stoddart, & Horan, 1997), specific hardware/ software projects (Office of Educational Research, 1995), preservice teachers (Omoregie & Coleman, 1997), student teachers (Fryatt & Gregg, 1997), university writing instructors (Anstendig & Meyer, 1997), schools (Beyer & Dusewicz, 1991), school districts (Niess & Merickel, 1997) and disabled students (Carey & Sale, 1997). In general, research has moved from studies of student achievement scores to interpretations of the effectiveness of computers for identified subject groups.

Technology and Teacher Training

The importance of technology and technology literacy is expressed by the U.S. Department of Education (1997) through the statement " Technological literacy -- meaning computer skills and the ability to use computers and other technology to improve learning, productivity, and performance -- has become as fundamental to a person's ability to navigate through society as traditional skills like reading, writing, and arithmetic" (p. 5). The same report mentions upgraded teacher training is key to integrating technology and increasing student learning.

The U.S. Department of Education and the United States Congress established the Technology Literacy Challenge Fund to help meet administration goals related to technology:

1. All teachers will receive training and support to assist students to learn and use computers and the Internet
2. All students and teachers will have access to contemporary multimedia computers in classrooms
3. All classrooms will have Internet connections

4. High quality, learner-centered, and affordable software and on-line learning resources will be developed related to learning standards and school curriculums. (U.S. Government Printing Office, 1997)

According to the U.S. Department of Education (Office of Educational Technology, 1995), two major barriers limit implementation of technology. The first is general teacher discomfort with technology and the second is lack of support for professional development for technology. A workshop sponsored by the Rand Corporation (Harvey & Purnell, 1995) reports teachers take a cautionary approach to technology because they cannot see practical classroom uses.

Commonplace in the literature on technology training are project descriptions or program evaluations. In a program evaluation of training, Hurst (1994) suggests teachers want continuous, flexible, and individualized technology training. Training directed at core technology skills should be task-specific to identified groups within the district (i.e., elementary teachers, math teachers, etc.). Hurst suggests semi-private training environments advance risk-taking behaviors.

Suggestions for effective technological development activities for teachers include professional development activities that are:

1. Continuous and embedded into the regular school routine;
2. Sustained and intensive;
3. Designed to assist teachers to integrate technology;
4. Active and allow hands-on use;
5. Designed to emphasize content and pedagogy;
6. Examples of good practice;
7. Designed around research findings. (Office of Educational Technology, 1995)

Approximately eight percent of teachers in a national survey with 516 respondents were identified as exemplary users. Data indicates four environmental factors consistently found in locations with exemplary users: (1) collegiality among users,

(2) school support for consequential technology use, (3) adequate resources for professional development, and (4) smaller class sizes. These finding are significant because other findings indicate exemplary users are the teachers making substantial changes in content coverage through the addition of technology (Becker, 1994).

Technology and Beliefs

Teachers who currently use technologies in classrooms use them to support existing teaching practices as add-on components or to provide students with practice and skills in basic computer literacy (Becker, 1993). Hadley and Sheingold (1993) suggest teachers who use computers do so because beliefs about educational technology match existing beliefs about effective teaching practices.

In a large survey study, data were obtained from 2,170 respondents to examine the relationship between beliefs about computer-assisted instruction and the amount, type, and frequency of computer-related activities (Niederhauser & Stoddart, 1994). Findings indicated beliefs about use of instructional technology could be grouped into two categories. The first category indicated computers were tools that students used for information literacy and the second believed computers were teaching machines to provide reinforcement and track student progress.

Honey and Moeller (1990) conducted interviews with twenty teachers in multiple contexts. Findings suggest teachers' responses can be categorized based on espoused teaching practices and levels of technological implementation. Teachers who reflected high levels of technological implementation tended to use student-centered goals and beliefs. Low implementation teachers reflected three orientations: (1) student centered but reluctant because of personal technological fears, (2) traditional practices but

reluctant because of fear of technology altering control relationships, and (3) student-centered but without resources. The authors suggest that discrepancies exist between existing beliefs about teaching and beliefs concerning the educational value of technology.

Studies about the implementation of technology into classrooms indicate technology may facilitate changes in teaching practice. Dwyer, Ringstaff, and Sandoltz (1994), in a study of thirty-two teachers who participated in the Apple Classrooms of Tomorrow (ACOT) program, suggest implementation of technologically rich classrooms require teachers to reflect about personally held beliefs about teaching and learning. Changes in instructional practices from curriculum-driven to student-centered practices were noted.

Summary

This review focused on four major areas. One section discussed beliefs of teachers and another section discussed organizational beliefs. The area of technology training was included in the section on adult learning and development. Under the general category of technology, discussion was directed toward research about technology's instructional effectiveness. This section also discussed the intersection of teachers' beliefs and technology. It is believed that representative understandings about adult learning and the beliefs of teachers are important for this study.

The section on teachers' beliefs discussed the importance of beliefs in determining teacher practice. Equally important is research that suggested that beliefs may serve as an interpretive element. It is believed that understanding of the determinant power of beliefs is important for analysis of any technological event.

The section on organization beliefs demonstrated that beliefs are not unique to individuals. Of interest to this study are the beliefs held in schools and the teaching culture. This section provided an overview of the culture of teaching and of schools. Core elements of teacher and school culture, developed in the early years of schools, continue to be in use in most locations. Little investigation has targeted the intersection of school culture and technology.

The next section provided theories of adult learning and development as guides to understanding professional development practices. A focus of this study is technology training for teachers. It is believed that understanding of adult learning theory should help in understanding the relationship between education, training, and adults. Characteristics of professional development programs were presented.

The final section on technology focused on the relationship of technology to schools. The effectiveness of instructional technologies in schools and suggested practices for technology training were presented. Intersection of teacher beliefs and technology was discussed.

Technology training for teachers is a specialized professional development activity. Activities of this nature occur in a world full of variables influencing the training. One factor that may influence the training experience are beliefs teachers hold about teaching and learning and such beliefs may serve as filters to guide understanding of the training experience.

CHAPTER III

METHODOLOGY

Chapter III presents the research methodology that guides this study and a rationale for the design. Discussion about selection of respondents and site, methods of data collection, and data analysis are also presented. An explanation of efforts to ensure that trustworthiness criteria are addressed is presented through discussion about the reliability, validity, and generalizabilty of the methodology.

Rationale for the Method

Qualitative research attempts to discover, through a defined course of inquiry, answers to social science questions by examining the social setting and individuals in that setting as one context. "Qualitative researchers, then, are most interested in how humans arrange themselves and their settings and how inhabitants of these settings make sense of their surroundings through symbols, rituals, social structures, social roles, and so forth" (Berg, 1989, p.6). This methodology allows researchers to "share in the understandings and perceptions of others and to explore how people structure and give meaning to their daily lives" (Berg, 1989, p. 6).

Symbolic interactionism is the theoretical school of thought that seeks to describe and explain interpretations humans give to experiences. This process of meaning-making is grounded in symbolism and shared agreement of meaning. Symbolic interactionists believe meaning and social interaction are linked. In this vein, symbolic interactionists

believe: (1) interaction is the source of all data, (2) perspective and empathy to another's role are key to understanding, and (3) definitions that participants give to a situation determines setting, actions, and the meaning of those actions (Berg, 1989).

Two major paradigms underlie educational research. Positivist inquiry is based upon the primary assumption that one reality exists and that this reality can be measured through component parts. Reality is seen as constant, measurable, and predictive through deductive methods. In contrast, naturalistic inquiry assumes multiple realities exist. Naturalistic inquiry suggests "...a highly subjective phenomenon in need of interpreting rather than measuring. Beliefs rather than facts form the basis of perception. Research is exploratory, inductive, and emphasizes processes rather than ends" (Merriam, 1988, p. 17). The researcher observes and reports on events in a natural setting through descriptive and interpretive language.

Another distinction the researcher must make concerns design of research. Again, two categories guide selection. Experimental research assumes variables may be manipulated during the study and this type of control investigates causal relationships. In this sense, experimental research is concerned with prediction. Nonexperimental or descriptive research is used "when description and explanation (rather than prediction based on cause and effect) are sought, when it is not possible or feasible to manipulate the potential causes or behavior, and when variables are not easily identified or are too embedded in the phenomenon to be extracted for study" (Merriam, 1988, p. 7).

The selection of any strategy is based upon the design of the study and the nature of the problem. In this study, beliefs of teachers and technology trainers about teaching and learning will be described and analyzed. The study of beliefs and related associations

is best served through naturalistic inquiry. The definition of nonexperimental research indicates that research that is descriptive and concerns the analysis of "messy" variables is best served by a nonexperimental design.

Case study research is one type of naturalistic, nonexperimental design. Yin (1989, p. 23) defines case study as "... empirical study concerned with the description and analysis of contemporary, contextually-bound phenomena using multiple sources of evidence in an attempt to understand the phenomena in another, more specialized manner." Merriam (1988, p. 16) defines case study as "... intensive, holistic description and analysis of a bounded phenomenon such as a program, an institution, a person, a process, or a social unit." Case study research design is frequently used in describing and analyzing educational phenomena (Merriam, 1988).

The decision to use case study is based upon the: (1) nature of the research questions, (2) amount of researcher control, (3) desired end product, and (4) identification of a bounded system (Merriam, 1988). In this study, the research questions are "how" questions (Yin, 1989). Through the design, the researcher will assume little or no control. The desired end product of this study is description and interpretation of a contemporary phenomenon. Boundedness of the system is indicated by connections that all respondents have to technology and technology training.

Yin (1989) lists three categories of case study: (1) explanatory, (2) descriptive, and (3) exploratory. The use of an explanatory case study was selected because a conceptual framework was used to focus investigation. The use of a framework does not imply a clear set of outcomes and allows the researcher to remain sensitive to emerging propositions for further investigation.

The case for this study is an urban elementary school located in a Midwestern state. The school resides in a multiethnic, upper middle class neighborhood. This school is one of four schools in the district designated as recipients of Federal Title III funds for technology. The site has received technology training to make use of recently purchased hardware and software. Technology trainers, operating through the district's professional development division, have conducted training at a centralized district training facility and on site.

Selection of Respondents

The research design and research questions guided the selection of respondents for this study. Since the purposes of this study were to describe and explore the impact of personal, professional, organizational, and societal beliefs about teaching and learning on the technology training experience, data were obtained from teachers at one site undergoing training in technology. The single site, with respondents undergoing a common training experience, created a bounded unit.

Prior to final site selection, building principals were contacted to determine the technology training occurring in their building. Several rural sites were rejected due to lack of computers in classrooms. Teachers identified as experienced users in these sites taught business or computer classes. Many inexperienced users had received no training on technology. In the site selected, the building principal expressed interest in the project. The researcher visited the site and met with the principal and the Special Technology Projects Director for the district. The urban site was selected because it possessed characteristics that were determined to be of interest to the study: (1) classroom teachers

with multiple levels of technological expertise, (2) computers in classrooms, (3) distinct patterns of computer use, and (4) teacher access to common training.

Selection of the site was determined by: (1) the potential of the site to generate data for answering research questions, (2) researcher access to the site, and (3) site approval and cooperation in the conduct of observations and interviews. The district Coordinator of Research and the school principal granted approval for the researcher to visit the site and interview, observe, and review documents.

Teachers were identified, through observation and selection by building level administration and peers as experienced or inexperienced technology users. Respondents were also asked to informally rate themselves as technology users. Trainers responsible for the technology training at the school were also identified. These groups were targeted because it was believed that representatives of these groups could serve as informants or "...one who understands the culture but is also able to reflect on it and articulate for the researcher what is going on" (Merriam, 1988, p. 75).

All teacher respondents worked in the same elementary school. All respondents were certified teachers, all used technology within the school setting, and all received training in technology or were presently being trained. The district trainers were responsible for the majority of technology training for the district, and each trainer was responsible for providing support to several schools throughout the district. Respondents meeting these characteristics represent a nonprobabilistic sample because they represent the bounded unit and have information needed to address the research questions. Selection of respondents was based on potential knowledge and inclusion within the

bounded unit. Nonprobabilistic samples can be extended to other locations through the use of general guides of practice.

The Oklahoma State University Institutional Review Board (See Appendix C) granted permission to conduct the research project. The interview protocol, with representative questions is included (See Appendix A). Each respondent, prior to the interviews, completed a consent form (See Appendix B). Assurance of confidentiality was maintained for all participants, the school site, and the school district throughout the study. Pseudonyms are used for the purpose of confidentiality.

Data Collection

The researcher functioned as the primary data collection instrument throughout the course of this study. The use of observational strategies, reviews of documents, and selected interviewing techniques placed the researcher at the heart of data collection. McCracken (1988, p. 19) suggests the researcher must "... listen not only with the tidiest and most precise of one's cognitive abilities, but also with the whole of one's experience and imagination." The researcher uses life experiences to aid in establishing categories and matching patterns in the data in the spirit of the symbolic interactionists who believe that perspective and empathy to another's role are key to understanding the meanings that participants ascribe to a situation (Berg, 1989).

Research is concerned with developing reliable and valid knowledge from collected data. "The applied nature of educational inquiry thus makes it imperative that researchers and others be able to trust the results of research - - to feel confident that the study is valid and reliable" (Merriam, 1988, p.164). To ensure reliability and validity issues were addressed, a combination of data collection methods were used. Multiple

methods also provide opportunities for contradictions to emerge from the data while providing thick descriptive evidence to allow the reader to follow the study and verify reliability and validity.

Three strategies were used to collect data in the context of this study: (1) semi-structured interviews, (2) direct observation, and (3) review of school documents, records, and products. Time in the field was contingent upon time needed to collect data, time available for interviewer/participant interaction, and the amount of data available. Yin (1989) suggests three data collection principles: (1) use multiple sources of evidence, (2) create a case study database to ease retrieval and storage, and (3) maintain a chain of evidence for increased reliability.

Interviews

The interview is an important source of data. "...human affairs should be reported and interpreted through the eyes of specific interviewees, and well-informed respondents can provide important insights into a situation" (Yin, 1989, p. 90). Merriam (1988, p. 72) suggests the purpose of an interview is to gain a special insight into "someone else's mind." Elaborating on this, Patton (1980, p. 196) explains:

> We interview people to find out from them those things we cannot directly observe... We cannot observe feelings, thoughts, and intentions. We cannot observe behaviors that took place at some previous point in time. We cannot observe situations that preclude the presence of an observer. We cannot observe how people have organized the world and the meanings they attach to what goes on in the world - we have to ask people questions about those things. The purpose of interviewing, then, is to allow us to enter into the other person's perspective.

This study used semi-structured interviews. The purpose of an interview with less structure is "*not* to put things in someone else's mind (for example, the interviewer's perceived categories for organizing the world) but rather to access the perspective of the

person being interviewed" (Patton, 1980, p. 196). In this format, all respondents received the same "grand tour" type questions (McCracken, 1988) but order and specific wording was subject to the flexibility demanded by the uniqueness of each respondents' perspective. Follow-up questions and probes were determined by the emerging "worldview" of the respondent (Merriam, 1988).

The researcher visited the site and interviewed each teacher in a face to face interview lasting approximately one hour. Technology trainers were interviewed at the district training site or assigned school sites in the same manner. The interviews were taped and supplemented with interview notes. The recordings were transcribed verbatim by the researcher.

Questions and prompts were divided into three major categories: (1) general beliefs about teaching and learning, (2) relationships between technology and education, and (3) personal experiences in learning to use technology. Examples of questions and prompts included:

(1) Talk about factors that help or hinder teaching and learning and about some that facilitate a good learning situation.

(2) Describe what you believe makes a good learner.

(3) How do you see the relationship between technology and your understanding about teaching and learning?

The interview protocol was first piloted and revised with input from teachers and trainers in the school district. The interview protocol and the preliminary questions are found in Appendix A.

Transcribed interviews were provided to respondents as a form of member checks. Respondents were encouraged to review the transcript, verify for accuracy, and alter the transcript to clarify concepts. A follow-up letter (Appendix D) was sent to respondents, thanking them for participation and asking for final thoughts before the publication of the report.

Observations

Observation was an important tool for collecting data allowing insight into the congruence between beliefs and actions. Various authors (Berg, 1989; Marshall & Rossman, 1989; Merriam, 1988; Yin, 1989) suggest use of multiple methods of data collection to provide a system of verification of information. In this study, use of observation is important because observations occured in natural field settings, allowing direct observation of the world of the participants. This contrasts with the artificial environment of the interview and the respondents' "secondhand" account of the world (Merriam, 1989, p. 87).

The conceptual framework of the study and research questions determined the focus of observations. Merriam (1989, p. 90) suggests elements present in observations include: (1) setting, (2) participants, (3) activities and interactions, (4) frequency and duration, and (5) subtle factors. Observations targeted general site characteristics, the interaction of teachers and technology in classrooms, teacher use of technology with/without students, and technology training sessions.

The researcher's position is one of "researcher participant" (Gans, 1982, p. 54 as quoted in Merriam, 1988) whereby the researcher participates in a social sense but functions primarily as a researcher. Observation requires entry into the location, data

collection, and exit. Formal entry into the sites was obtained through the Director of Research and the building principal. The observation phase of the study was scheduled to last from six to eight weeks.

Entry requires establishing a relationship with the location by: (1) becoming familiar with the site, (2) remaining relatively unobtrusive, (3) and establish a rapport with participants through acknowledgement of site-specific routines and needs (Merriam, 1989). Observation followed the familiarity phase. Once the researcher was aware of what could be observed at the site, data collection began to understand to gain an understanding of the school culture in three areas: (1) technology, (2) teaching, and (3) learning. Training sessions were observed to gain understanding of the climate and content of training experiences. Exit from the site occurred when no new data began to appear. Berg (1989) suggests these observation strategies: (1) record key words and key phrases, (2) identify sequence of events, (3) limit amount of time spent in the field, (4) write full notes immediately following exit from the field, and (5) complete the full notes before discussing the observation.

Aided by on-site notes, the researcher recorded observations for data analysis purposes. Field reports contained the date, time, participants, location, activities, and observer comments. Observation forces researchers to become primary data collection instruments, maximizing use of the researcher's life experience as a basis for interpretation of events. The interpretive natures of humans affect how data are seen and recorded. Even with potential for researcher bias, observation is a powerful tool to understand beliefs and motives. Merriam (1989, p. 103) states, "The human instrument is

capable of understanding the complexity of human interaction encountered in even the shortest of observations."

Since many of the participants had received training prior to the arrival of the researcher on the scene, it was impossible to directly observe training to practice. Training sessions with other users were observed. Interviews and conversation with users allowed the researcher to have knowledge of the training from the participants' perspective. Inferences were made about the respondents' training based on training observed, training documents, and information provided to the researcher by respondents. One training session with two participants from the site was observed.

Document Review

Document review was selected as a data gathering technique because it is less intrusive than interviews and observation. This contributes to data accuracy. The use of the term "document" is not intended to imply that only paper form documents are subject to review. For the purpose of this study, documents are defined to include "public records, personal papers, physical traces, and artifacts" (Merriam, 1988, p. 117).

A strength considering documents as a data collection strategy is stability. Documents are relatively "objective" sources of data since the presence of the researcher does not alter the document simply by being in the location (Merriam, 1989). Another strength is the "unobtrusive" or relatively neutral nature of document review. Lastly, documents can "ground an investigation in the context of the problem being investigated" (Merriam, 1989, p. 109). Documents reviewed for this study were prepared prior to the arrival of the researcher upon the scene (i.e., prepared training materials, lesson and unit

plans, technology plans, curriculum manuals, and student handouts). Documents of this type are "non-reactive and grounded in the context under study" (Merriam, 1988, p. 118)

Document review tends to center on "public records," "personal documents," "physical trace material," and specially prepared documents for "learning more about the situation, person, or event being investigated" (Merriam, 1989, p. 114). For this study, public record and physical trace materials were primary sources of data.

Paper-based documents were directed toward technology and technological use in the school. Hierarchical search and review strategies were used, moving from general documents (i.e., district level documents) to specific documents (i.e., teacher created documents). District and building level documents about programs were reviewed. Training materials were analyzed instead of actual training documents used by some respondents. Training material had been saved by the respondents and was available for review. Electronic documents, teacher prepared materials, handouts, and physical trace materials (Merriam, 1989) were also reviewed.

Data Analysis

Yin (1989, p. 105) states "data analysis consists of examining, categorizing, tabulating, or otherwise recombining the evidence to address the initial propositions of the study." Qualitative research is an emerging design, dictated by the data and interpretation (Merriam, 1988). In qualitative research data collection is continuous and simultaneous with data analysis. Analysis begins with the first data collection strategy, leading to increasing sophisticated categorization and interpretation of evidence. New data generates or refines analytical categories and techniques. Simultaneous analysis compresses the data into thematic units and refines thought about initial analysis. This

strategy can be summarized as "an interactive process throughout which the investigator is concerned with producing believable and trustworthy findings" (Merriam, 1989, p. 120).

Merriam (1989) cites Bogdan and Biklen (1982) for suggestions about analyzing data during the collection process. These nine suggestions are summarized below:

1. Deliberately narrow the focus of the study
2. Define exactly the type of study being pursued
3. Develop analytic questions
4. Plan collection activities in light of revelations from the data
5. Habitually write "Observer's comments"
6. Habitually write notes to self about what is being learned
7. Try out ideas, themes, and categories on respondents
8. Go back to the literature
9. Play with metaphors, analogies, and concepts.

Simultaneous data collection and analysis is useful to narrow the focus of the study by establishing categories of thought that emerge from collection. The development of an evolving framework for analyzing data allows the researcher to be sensitive to trends and themes developing over the course of the study.

Lincoln and Guba (1985) provide four suggestions for ending data collection activities: (1) sources are exhausted, (2) categories are saturated, (3) regularities begin to emerge, and (4) over-extension (p. 350). Once these conditions are met, a decision is made to end data collection activities. Following data collection is data organization. Data organization sorts data into logical categories. The researcher reads through all data from beginning to end to get a general feel for the data. Intensive analysis follows where data "are consolidated, reduced, and, to some extent, interpreted" (Merriam, 1989, p. 130). Initial guides for consolidation of data are research questions and the conceptual

framework. Furthermore, the researcher will be "holding a conversation with the data, asking questions of it, making comments, and so on" (Merriam, 1989, p. 131).

At this stage, the researcher begins to unitize the data (Lincoln & Guba, 1985). Units reveal information about the study, provide organizational structure, and are the smallest piece of data capable of standing alone (Lincoln & Guba, 1985). This categorization strategy places data into increasingly smaller categories. Emergent themes and categories are then placed in "conceptual categories, typologies, or theories to interpret the data for the reader" (Merriam, 1989, p. 133).

To delineate categories, Lincoln and Guba (1985) suggest researchers should be prepared for "anomalies, conflicts, and other inadequacies" to emerge (p. 348). Researchers may rearrange or revise categories as additional data are added to categories. Previously established rules and organizational structures may require modification or exclusion, establishing new categories. Categories are checked in relation to the whole to look for missing, incomplete, or inaccurate categories.

Member checks were used to ensure the credibility of the study. Respondents were provided typed copies of the transcripts of the interview. Revisions, additions, and deletions were requested. The transcripts were hand delivered to the respondents, placed in their school mailbox, or mailed to the school address. Two responses were noted on the member checks. One respondent added additional information. The other respondent corrected the transcript to standard English, deleting pauses and awkward sentences throughout the transcript. Respondents were also provided opportunity to comment on the accuracy of the categorization process. No responses were noted about the categories.

Copies of the letters that accompanied interview transcripts and categorization are included in Appendix D.

It is possible that the theoretical framework proposed for this study would yield findings that would not allow the researcher to develop assumptions based on the research questions. The use of a conceptual framework as a lens to view the phenomena carries the possibility that the lens is not appropriate for illuminating the phenomena. Such information should be reported, and suggestions advanced for a framework that bounds the case in a manner that allows assumptions to be advanced based on knowledge gained from the present study.

Researcher Bias

The potential for researcher bias was addressed in this study. The introduction of an outside researcher into a setting may alter behaviors by the presence of the researcher. Additionally, researchers bring a unique perspective to data collection and data analysis, coloring the interpretation of events, processes, and people. Researchers must be sensitive to internally held beliefs that affect the study and minimize the effect of these beliefs consciously or by reporting on the bias in the final product.

There are professional and personal experiences that could potentially color this study. Generally, these biases include an understanding of the culture of schools and educational technology. Through over twenty years experience in public schools as a teacher and administrator, this researcher has extensive knowledge and understanding of the use of technology in the classroom. Experiences as a district technology coordinator, project director for grants emphasizing technology, and working with undergraduate and graduate students in the use of technologies in classrooms contribute potential biases as

well. Identification of potential biases is critical in the recognition and suppression of these biases.

Researcher bias will be addressed by the use of trustworthiness criteria, essential for establishing internal validity and reliability. Multiple data sources will be utilized so the researcher's impact on data is minimized. Comparison of multiple data sources allows verification of consistency of information obtained over varied times and by varied methods. Consistency in data patterns from different data sources and explanations for differences in data from various sources contribute to credibility. Patton (1980) cautions multiple data sources may illustrate differences since different data sources may capture different aspects of the case under study. "The point is to study and understand why there are differences" (p. 331).

Issues confronting researcher bias confront the trustworthiness of the data. Trustworthiness of data is dependent upon the trustworthiness of researchers who collect and analyze the data. "Competence is established by using the verification and validation procedures necessary to establish the quality of analysis" (Patton, 1980, p. 338).

Trustworthiness

Awareness of limitations due to the perspective of the researcher aids the development of objectivity. Multiple data collection sources aid triangulation, thereby addressing trustworthiness through increased reliability and internal validity (Merriam, 1988). Internal validity or credibility concerns the degree to which findings match reality. Reliability or transferability deals with the extent to which findings could be replicated. Multiple methods also provide thick, descriptive evidence to allow the reader to follow the study and verify these issues.

Internal Validity

One of the primary assumptions of qualitative research is that reality is not fixed. Qualitative research, especially in the symbolic interactionist tradition, is concerned with how others construct reality or a worldview. Judging validity rests on how adequately interpretations were represented by the researcher. Lincoln and Guba (1985) suggest this test is contingent upon the degrees to which the researcher's representation of another's version of reality are "credible to the constructors of the original multiple realities" (p. 296). Methods must be utilized to ensure that the researcher's report of the respondent's world is congruent with the world in which the respondents live.

Merriam (1989) presents six methods to increase the internal validity of the study:

1. Triangulation
2. Member checks
3. Long-term observation to gather data over time
4. Peer examination
5. Involvement of participants in the research
6. Clarifying the researcher's biases at the beginning of the research.

The present study utilizes five of the six strategies to increase the internal validity of the study: (1) triangulation, (2) member checks, (3) peer examination strategies, and (4) clarification of researcher's biases. The involvement of participants in the research, through validation procedures in the analysis phase will be discussed under member checks. Long-term observation was not used because the researcher withdrew from the site after redundant data began to emerge.

Triangulation compared data obtained from interviews, observations, and document reviews. Data were reviewed to discover consistencies and inconsistencies in the data from different sources. Explanation was sought for agreement and disagreement.

Triangulation ensured that data from multiple sources and over multiple time frames exhibited patterns of consistency sufficient to establish trustworthiness.

Member checks were used as a method to increase validity. Respondents were asked to verify the accuracy of the transcription and given the opportunity to clarify concepts and items. Peer evaluation strategies were used to allow experienced colleagues comments of findings as they emerged. Dr. Martin Burlingame functioned in this capacity, bringing experience and expertise in qualitative research to the analysis. Researcher biases are outlined in the previous section of this report. Appropriate strategies were used to ensure biases were minimized during all phases of the study.

Reliability

Reliability refers to replicability and is a concern in qualitative research because this research paradigm assumes multiple realities exist. Existence of multiple realities precludes the idea there is one reality serving as a benchmark from which to compare all other realities. Qualitative research seeks to describe and explain the world from the view of the creators of multiple realities.

The interpretive nature of qualitative research makes it unlikely that replication will produce identical results. Various individuals perceive the world differently and view the world from a place and time that is contextually bound. The very nature of qualitative research precludes replicable results. Merriam (1989, p. 171) states:

> Because what is being studied in education is assumed to be in flux, multifaceted, and highly contextual, because information gathered is a function of who gives it, and because the emergent design of a qualitative case study precludes a priori controls, achieving reliability in the traditional sense is not only fanciful but impossible.

Lincoln and Guba (1985) provide three techniques useful to establish dependability or consistency of results: (1) explanation of the researcher's position (theoretical, relational, and social), (2) use of triangulation, and (3) development of an audit trail. This study used these three techniques to establish dependability. Explanation was provided regarding assumptions and theory, researcher's relationship to the group under study, selection of respondents, and the social context of the site. Multiple methods of data collection and analysis were used. Detailed descriptions of how data were collected, the development of categories, and decision processes throughout the study are available to guide other researchers.

Summary

Chapter III presented a rationale for this design based on the symbolic interactionist perspective. The section on methodology established guidelines followed throughout the design of the study. Explanation concerning site and subject selection was presented. Methods of data collection and data analysis were presented. Reliability and validity measures were presented.

CHAPTER IV

THE CASE

The previous chapters explained the purpose of this study, provided review of related literature, and presented methodological considerations that guided this study. This chapter will present the data gathered by the researcher during field work. Three research questions guided the collection of this data. These were:

(1) How do personal, professional, organizational, and societal beliefs about teaching and learning influence teachers' (experienced users of technology, inexperienced users of technology, and technology trainers) interpretations of technology training experiences?

(2) How do interacting beliefs about teaching and learning influence how teachers (experienced users, inexperienced users, and technology trainers) interpret technology training experiences?

(3) How do described similarities and differences in the beliefs of teachers (experienced users, inexperienced users) and technology trainers influence technology training experiences?

Preliminary Steps and Site Entry

Two characteristics were of interest to identifying potential sites for this study. The primary consideration was to locate a site that was undergoing or had recently undergone technology training. Another consideration was to find a site with a

continuum of technological users, allowing users to be characterized regarding type and frequency of use. An urban site was selected because it possessed characteristics that were determined to be of interest to the study. The site had teachers with multiple levels of technological expertise and differentiated usage patterns. Computers were in evidence in multiple locations and teachers had received common technology training sessions or were presently receiving training.

The building principal and the Director of Special Technology Projects expressed interest in the project. The district office of Planning, Research, and Evaluation required written application for research and multiple copies of the research proposal. A team of district administrators reviewed all materials. Approximately two weeks later, approval was granted to conduct research. Points of contact were provided, and individuals were contacted for permission to begin data collection. Data collection was delayed due to negotiated agreement between the local bargaining unit and the district regulating the times and lengths of after-school meetings. The building principal scheduled the first available date for the initial meeting with the faculty.

Selection of individuals for the study was based on information provided by observation, peer review, and the recommendation of the principal. Initial selection criteria included identification as an experienced or inexperienced user, type of technology use, and accessibility. The principal identified three experienced users and two inexperienced users to observe. Observation confirmed experienced and inexperienced users were using technology in classrooms and the computer lab. Additionally, during the course of the interviews, respondents were asked to informally rate themselves as users, and to recommend other users identified as "particularly strong

or weak technology users." Trainers were identified after conversation with the Special Technology Projects Director and the Technology and Support Training Coordinator. Criteria for selection of trainers were role and accessibility related.

The researcher visited the school site to interview and observe teachers representative of experienced and inexperienced users of technology. District trainers were interviewed and observed at district training facilities or assigned school locations. Eighteen visits to the site or to district training facilities were conducted, totaling approximately ninety hours.

Description of the School Site

Traffic moves steadily up and down a major East-West thoroughfare in a Midwestern city. The metal skeletons of several large red and white transmission towers reach toward the sky. A barbed wire fence, sagging in several places, separates pastureland and wooded areas from the groomed lawn of a television station. Trees without leaves, cedar trees with evergreen branches, and uncut brush appear in intermittent patches throughout the brown and gray landscape.

The two-lane roadway points to the city. Pastureland, dotted with pump jacks and oil storage tanks, runs along low hills. As trees become less frequent, occasional glimpses of the well-groomed grounds of a golf course appear. The road crosses a railroad track and changes to four lanes on the outskirts of the city. Brush and trees turn to the asphalt and concrete that dominates the landscape of a mixture of auto repair shops, storage units, and a burial vault company (Field Notes, January, 1999). Along this artery to the city, discount stores are intermingled with a mixture of convenience stores, the occasional liquor store or pawn shop, small strip malls, and churches. Noticeable, even in this

eclectic mixture of stores and shops, is the pump jack sitting prominently in the middle of an asphalt parking lot in front of a discount food store (Field Notes, January, 1999).

Flashing yellow lights carefully define the speed limits for the school zone of a large, private, religious school. A turn into a residential neighborhood shows a faded sign, "Warning. This is a community watch neighborhood. Someone is watching you." Carefully tended lawns and well-maintained houses are in evidence. Lawns have been mown, shrubs trimmed, and leaves collected. Security signs warning of alarm systems and commercial monitoring activities are prominently displayed in front of most houses.

Yellow signs define the limits of a school zone. Sitting on approximately ten acres of land, surrounded by the neighborhood, is the school. The one story, red brick building is rectangular. The brick, slightly dulled by thirty-five years of exposure to the elements, shows no evidence of graffiti. The trim, in places, shows evidence of wear from weather and age by the fading and peeling paint. "That's not peeling paint. They came out two years ago and scraped it. They haven't been back to paint it." (Ms. Washington, Field Notes, February, 1999). Located near the street is a sign proclaiming the name of the school with a marquee-like section announcing results of the Parent Teacher Association's membership drive (Field Notes, January, 1999).

The clear sound of metal rhythmically banging on metal leads the viewer to the flagpole. Near the flagpole and the front doors of the school are bicycle racks. A large grass playground with colorful playground equipment dominates the rear of the setting. Adjacent to the playground are several portable buildings and an asphalt play area. A driveway for parents to pick up students and a parking lot are located within the school site.

A sign, prominently displayed on the front door, states "All visitors and guests are required to register at the school office." Once inside the door, visitors see large posters that call attention to the school mission statement, the school dress code, and a definition of effective schools. On the other side of the door is a poster listing the goals and the mission statement of the Board of Education. (Field Notes, January, 1999). The district's concern for security is evident. Employees wear laminated badges that identify them as district employees. Visitors are required to sign in, state their purpose, and log the time of entry to the building. Visitors are given a blaze orange sticker identifying them as a visitor.

The office area begins at the corner of the hallway intersection. The area is clearly defined by a large counter with a sliding glass window. Directly across from the office is an oak bench and a large artificial potted plant. On the wall above the bench is a large bulletin board covered with certificates for students of the month. Near the bench are mailboxes for the teachers.

Two tone painted cinderblock hallways lead from the office to classrooms. Few marks or stains appear on the painted surfaces. Well-worn gray tile with flecks of white and brown, common in many schools, covers the floor. Small scuff marks and evidence of wear are seen on some of the tiles, but all reflect a recent polishing. The ceiling tiles show the most evidence of wear, appearing scraped and scarred.

A student-made progress chart is taped to the hall wall. Nearby, a peer mediation schedule is posted. A large inspirational poster exhorts students to remember "Anything is possible when you believe in yourself." Bright, colorful bulletin boards are found throughout the building. The names of the classroom teachers are displayed in bright

cutout letters near classroom doors. A handwritten inspirational message is displayed near the front entrance of one of the classrooms, "You are now entering the classrooms of the world's best students. Please sharpen your intellect, your assertiveness, and your perseverance, for we shall surely challenge you, too, to be the best you can be." Examples of student work and inspirational messages dot the hallway (Field Notes, January, 1999).

Many of the inspirational messages found on the walls were commercially produced. Student work examples ranged from handwritten work samples to art projects. One bulletin board located near a classroom was partially covered with student work samples created on a word processor. Messages from the P.T.A. were created on a color printer.

The main building has sixteen classrooms organized into four wings. Included in the main building is a computer lab, a room shared by the art, vocal music, and Spanish teachers, a library area, a room shared by the Speech/ Language Pathologist and the counselor, a workroom, a clinic area, a cafetorium with a stage area, the office complex, and a small patio area. To the rear of the building, separated by a small yard area, are six portable classrooms. The center of the interior of the school is dominated by the office complex, clinic, workroom area, additional storage, a conference room, and the restrooms for the building.

The workroom is large. Four banquet style tables make up the center of the room. Around the perimeter of the room are found: a faded and worn couch, a refrigerator, a soda machine, teacher mailboxes, a microwave oven, two types of copiers, and assorted odd equipment. On top of the mailboxes are Core Knowledge scope and sequence books

for each grade level. Posted on various bulletin boards are assorted schedules and information for the teachers. One bulletin board is for staff development opportunities throughout the district. Stapled near the top of the board is a flyer listing the technology training sessions for a two-month period.

The most noticeable thing about the workroom is that it is deserted for much of the day. Teachers do come to the workroom to use the copiers, get a soft drink, or to get something out of the refrigerator. Mail is posted at the other mailboxes. The copier or the Risograph machine gets the bulk of the use in the room. When the copier is out of service, the workroom is almost unused. The room is full at lunch as teachers scramble to eat and talk with other teachers in the limited time available. For many, this is the only time during the day to talk at length with other adults (Field Notes, January, 1999).

Sidewalks lead the casual observer to a scene that stands in stark contrast to the well-maintained image of the main classroom building. Beneath covered walkways stand the six portable classroom buildings. The light brown color of the buildings, scarred in many places, emphasizes bumps and dents in the corrugated metal walls. The brown paint is peeling, revealing spots of white and brown. Each roof, obviously painted white at some time in the past, is faded and streaked from age. The covered porch that runs the length of each group of portables sags in numerous places. Cinderblocks that serve as the foundation of the buildings are broken and cracked (Field Notes, January, 1999).

> I've called them our third world annexes since I came here. I have turned in requests every year on them. Mrs. FCP says that they are worse than any third world annex because she was watching National Geographic and saw some third world annexes. They looked better than ours. (Ms. Washington, February, 1999)

A Day at School

Several cars pull into the turn-in and discharge children into the cold, crisp morning air. Other cars pull past the asphalt turn-in to briefly park on the street and let children out. In the street, other cars sit idling, waiting for a chance to pull into the L-shaped parking lot.

> Yeah, you can't get close to the school from 8:00 to 8:30 in the morning and from 2:30 to 3:00 in the afternoon. Most of these parents bring their kids up here in the car if they can. I come to school earlier than I normally would just to make sure I get a parking place. (Ms. Lincoln, February, 1999)

Among the cars parked in the street, doors quickly open, and students run across the front lawn to the doors of the building. The cars that pull into the parking lot discharge children at a slower pace. Drivers often wait until the children from that vehicle are safely in the building before carefully checking for other cars and other children and pulling away from the curb.

> These parents are real protective of these kids. Many of these families have moved here from somewhere else. This is a pretty safe neighborhood but you never know...things can happen anywhere. I would rather they take precautions than to have something happen to a child. (Ms. Jefferson, January, 1999)

Once inside the doors, students move determinedly to classrooms. Early arrivals move from the cafetorium to the hallway as they go to class. Starway Elementary School (name changed for confidentiality purposes) offers Star Care, a type of before and after school licensed care. Parents, for a fee, are able to drop off students for supervised care beginning at 7:00 in the morning. Parents enroll their children in the program, and the program usually runs at capacity. The program is inexpensive, and all workers are certified teachers.

Brightly colored backpacks mingle with the patterns of coats and windbreakers layered over jeans and windsuits. Athletic shoes, with bright colors and distinctive patterns, rhythmically pump their way to the classroom. The rapid influx of students disappears as rapidly as they appeared, and the halls become empty except for a few stragglers rushing to class.

School begins at 8:30 A.M. Students who arrive later than this time stand waiting in line to get an admit to class. The principal, standing behind the counter of the office, greets each student by name as they make their way to the counter. A low volume mumble can be heard from the student at the head of the line. The principal, smiling, says "Honey, I need you to say 'My name is Amanda Lincoln and I am in Mrs. Adams class.' The girl answers, "Amanda Lincoln, Mrs. Adams". "No, honey. I need you to say it as a complete sentence. That way, Mrs. Washington can fill these slips out without looking up and get you to class." "Okay. My name is Amanda Lincoln and I am in Mrs. Adams class," replied the girl. "Thank you, Amanda. Why don't you go on to class. Be sure and give this slip to your teacher," replied the principal. The next student stepped up to the counter and boldly states her name and her teacher's name (Field Notes, January, 1999).

> I try to get them to speak in complete sentences so that they will think in complete sentences. I believe it really helps. One of the teachers complains that it takes too much time to greet someone in the lunch line. I've asked them to hang in there and keep trying it to see if it makes a difference. I think it does. (Ms. Washington, February, 1999)

Suddenly, after a few minutes, students are again in the halls. Groups of students walk in single file order to join other students lining the hallways. Teachers are heard to exhort students to walk on the right side of the hall and to cross their arms. Students in one section of the hallway are holding two U.S. flags. The crackle of the public address

system becomes the nervous voice of a student, "Hello, my name is Carolyn Jefferson. Please join me in the Pledge of Allegiance." After the Pledge, voices in unison are heard repeating the School Creed.

> We, as students at Starway Elementary School, must always remember that an education is our country's gift to us. We will be the best that we can be. We will do the best we can do. We will spend our time achieving our success, rather than accepting failure. We will respect the teachers and our fellow students. We will be helpful to our school. We are intelligent individuals with thoughts of our own. We will try our hardest and never give up. We will strive to fulfill our creative ideas. We are open to learning new things. We know our goals are within our reach. (Field Notes, January, 1999)

A student reads the saying of the day. The lunch menu is repeated. Students return again to the classrooms. The halls are empty again.

A walk into any classroom surrounds the viewer with color and text. Taped on the window to the classroom is the sign "We will be the best that we can be." A timeline, a chart about telling time, and a colorful calendar clash with competing swatches of bright color. Above the chalkboard, the alphabet is displayed. Posters list the rules and consequences, the grading scale, and the morning procedures. Inspirational posters are strategically placed throughout the room.

> I believe the posters help. That's part of the Great Expectations program, you know. We talk about what they [posters] mean a lot. Even though they are only in the third grade, they need to think about the messages up there on the wall. Great Expectations uses a lot of quotations and sayings and things. It makes the kids think about things...(Ms. Carter, January, 1999)

Books are everywhere. Worn encyclopedias, with torn spines and discolored covers, are stacked upon a chair in the corner. Three bookcases are filled with trade books in various stages of condition. Two classroom sets of trade books with the same

title fill the end of one of the bookcases. Near the teacher's desk are shelves that contain many different textbooks and teacher's editions.

> I try to get as many books as I possibly can into the classroom. I want them to read. I use classroom sets and trade books. I try to get them to the library and have assignments that force them to read. I try to ask questions that make them go back to the book and find out what happened, and why it happened. Reading is so important for their future. (Ms. Johnson, January, 1999)

The green chalkboard at the front of the room is streaked and stained from years of use. Cabinets, with wooden doors covered with student work, frame a set of coat hooks and shelves. Low bookshelves, stacked with colored wire baskets full of colored blocks and markers, are lined against one wall. Near the corner sit three computers. One, obviously much newer, is on a plastic, wheeled cart.

The teacher walks to the front of the room to begin the lesson. "Okay, let's start by counting by threes." In unison, the voices begin to count, "Three...six...nine..." The teacher shouts, "Great job. Remember how hard that was at the beginning of the year...well, it sounds like you have been saying that your whole life. Let's try sevens now..." At the conclusion of the choral response part of the lesson, the teacher asks, "When would we use this type of counting?" Hands shoot up as students, through facial gestures and body contortions, attempt to attract the teacher's attention (Field Notes, January, 1999).

The lesson transitions to a scripted math lesson on skip counting. The teacher provides the students with appropriate examples written on the chalkboard. Questions are called out and students raise their hands to respond. "Let's look at patterns now. What number goes on the blank between these numbers?...Millie, want do you think?" As the answer is posed, the teacher provides verbal reinforcement and then asks the student to

tell the class how she arrived at that answer. Several more questions are posed in a similar manner. The teacher begins to hand out worksheets. Students take the offered worksheet and quickly begin to write down answers on the sheets. Students look intently at the worksheet, scratch furiously on the side of the sheet, and write another answer on the sheet. Work continues in this manner until the teacher announces, "Time is up for math. If you have not finished, you will need to do so in your spare time today or tonight at home. Put your handouts away and let's get ready to go to P.E. Okay, Row one...let's line up. Remember...eyes front, mouths closed, and arms crossed...Line leader, take us to P.E." (Field Notes, January, 1999).

The remainder of the morning proceeds in a very similar manner. Transitions between lessons are routine and minimize disruption. Students ask permission to go to the restroom or to work on the computers after work is completed. Papers are graded and returned. Students work individually on various assignments. Through the window to the hall, the tops of heads can be seen as a class returns from the computer lab. Another row of heads is seen moving in the opposite direction. The business of school goes on, inside the classroom and throughout the school.

Routines are very much in evidence. Movement in the halls, lunch procedures, pushing chairs under tables, general manners, desk organization, and many other routines are consistently seen. "The routines and procedures really help. We don't have to waste time doing and saying the same things again and again. Sure, we have to remind them at times, but...it really helps" (Ms. Lincoln, January, 1999). "The emphasis that we put on routines at the beginning of the years is a pain. You drill and drill and drill. However, look at the time it saves now...(Ms. Nixon, January, 1999).

> I think the kids need the structure and the security that routines provide. They want to know what is coming next. They want to know exactly what is expected of them. They don't want to guess. Routines make it so they can concentrate on academics and learning. (Ms. Washington, February, 1999)

Consistent responses to student actions appear to be the norm. Correction is delivered promptly, usually in a personal talk between the student and the teacher. Severe infractions, usually involving some sort of direct challenge to school authority, are handled by the classroom teacher. The student is taken to the office and the teacher uses the telephone to contact parents or guardians.

Lunch time is near. The students line up according to routine. The walk to the cafetorium is uneventful. Students walk on the right side of the hall with folded arms. Little or no conversation is apparent. Entry to the cafetorium is through double doors near the office. As one class enters the lunch area, another leaves through doors at the opposite end of the cafetorium.

On one wall of the cafetorium is a large, handpainted mural of the state. Between the doors for the serving area is a large traffic light used to control noise in the cafetorium, changing color as the level of noise dictates. Too much noise equals a red light and loss of five minutes of time for talking at the lunch table. Students are seated by classes. Students wait and receive permission to take their trays to be dumped and then return to wait until their class is walked to the doors that lead outside.

Recess takes place on the large playground to the rear of the building. The newest play area is a multi-station piece of apparatus purchased by the Parent Teacher Association. The equipment is stationed in a graveled area defined by landscape timbers.

> Our PTA bought that for the school. Seventeen thousand dollars, I think. The little kids love it. They aren't allowed way out there on the

> playground anyway. So they play mainly on this and the equipment over there. Our PTA has been really supportive and easy to work with. There's no way we would have gotten this without their help. (Ms. Harding, February, 1999)

Several groups of students are playing basketball on the two goals on the asphalt area. Several other students are "posted" near the outside wall of the building near the basketball area. These students remain standing throughout lunch and are not allowed to mingle with the other students on the playground.

> They really hate standing over there. Everyone can see them and they can see everyone. It's really bad on these nice days when you everyone is out here running around and having a great time. They want to play so bad they can taste it. They really don't like being removed from their friends. They really don't give us much trouble. They go do their time and get it over with. (Ms. Truman, Field Notes, February, 1999)

The end of lunch recess begins a full afternoon of instruction. Instruction continues at almost the same pace as the morning session. Specialized programs, called "pull-out programs" by the teachers, appear to break the day into blocks of time. Some of the special teachers come on certain days so there are pull-outs at different times throughout the week. All classes (K-5) attend computer lab, physical education, music, and library. Two grades (4 & 5) attend art one day a week and attend Spanish two days per week. Spanish is also taught to the other grades by a sign up system. Fourth and fifth grade students also attend Strings. The Strings class meets one time during the week. There is also an Honor Strings class that meets one time per week (Field Notes, February, 1999).

> You know, some days we don't have them for much more than an hour and a half. They go to this program and to that one. We are still required to cover all the curriculum...just with a lot less contact time. That's hard on some of the kids...real hard. (Ms. Johnson, January, 1999)

At the end of the school day, classes are walked to the loading/ unloading areas at the front of the school. Teachers supervise students for fifteen minutes. Students that have not been released to parents go to the cafetorium for the Star Care Program.

> This frees the teachers for parent conferences, grading papers, and preparing for class. They're professionals and this shows the parents that we expect them to be treated as such. We charge for the kids that aren't picked up and the parents have come to expect that. (Ms. Washington, Field Notes, February, 1999)

Friday mornings are reserved for Rise and Shine Assemblies. Students meet in the cafetorium shortly after the morning begins. Students and teachers from the upper grades lead the ceremony. The Pledge of Allegiance and the school Creed is recited by all. Morning announcements are covered, and the awards are announced. The Golden Trash Can Award, Spirit Stick, Teacher's Apple Award, Caught You Being Good, and birthday recognition are standard weekly awards (Field Notes, January, 1999).

The District and Technology

The Oakway City Public School District (name changed for confidentiality purposes) had little technology for instructional purposes prior to 1993. Most technologies consisted of older computers (Apple IIs, IBM 25s, and IBM PC JRs) and audiovisual equipment. "Student access to technology, practically speaking, was non-existent" ([Oakway] City Public Schools, 1998a, p. 8).

In 1992, a 7.5 million dollar bond issue for technology was passed. In the following two years, electrical service was upgraded at all school sites to support installation of computers and local area networks. Initial computer technologies consisted of twenty-four computers, printers, and one file server connected to local networks. One multimedia station was purchased for each school. Software supported the Integrated

Learning System on each school's local area network ([Oakway] City Public Schools, 1998a).

Another significant influx of technology came into the district during the 1997-98 school year through a Title III grant. Major components of the district's Title III proposal included: (1) development of a distance learning facility for the district's administration building, (2) one high speed Internet line for one middle school, (3) one laptop computer per school for four elementary schools, (4) thirteen multimedia computers and educational software for four elementary schools, (5) one computer presentation station for four elementary schools, (6) cabling and Internet access for four elementary schools, (7) LightSpan software for a dual language program school, and (8) Internet training for high school social studies teachers ([Oakway] City Public Schools, 1998a).

Substantial progress has been made toward most of the goals. Computers and software are in place in four elementary schools. All four sites have been cabled for connectivity. The elementary site piloting the LightSpan project has received equipment. Some of the secondary social studies teachers have been trained on the Internet. The district distance learning lab is not in use due to delays in receiving funds for the purchase of telecommunication services. The elementary sites are not connected to the Internet due to the same problem. The district has purchased all necessary distance education equipment ([Oakway] City Public Schools, 1998a).

Six district trainers are responsible for delivering the training to the Title III schools and to other schools in the district. Initial Title III training was conducted over a five-day session. Training topics included: (1) introduction to software and hardware, (2) operating systems, (3) specific software applications, and (4) maintenance and scheduling

issues. All school computers purchased through this grant were placed on carts for mobility purposes. The acronym COWS (Computers On Wheels) is used for these systems. The large presentation system, affectionately called the Mama Cow, is also on a cart to facilitate movement between locations. The COW theme is obvious throughout the training cycle. Training handouts are decorated with graphics of cows (Field Notes, January, 1999). During the graduation ceremony from training, female graduates are given COW pins and male graduates are given ties decorated with cows. Months after completion of training, most teachers refer to the systems as COWS.

The district technology trainers have multiple duties. Thirty-five technology training sessions, over a wide range of topics, are listed for a two-month schedule ([Oakway] City Public Schools, 1998b). Sessions focus on management of the Integrated Learning Systems, general software applications, and specialized applications. Times are organized for morning sessions, afternoon sessions, after school sessions, and Saturday sessions, with training ranging from three to seven hours ([Oakway] City Public Schools, 1998b). Trainers also specialize in other technology specialties (i.e.—Integrated Learning Systems, management of the computerized testing program for reading, etc.). Each trainer is also responsible for a number of schools in the district, providing general training and support (Field Notes, January, 1999).

Respondent Information

Interviews were conducted with selected respondents after observation allowed identification of key informants for this study. Informal conversations and observations were recorded as field notes throughout the study. For the purposes of confidentiality, respondents have been assigned female names. This does not reflect the gender

breakdown of the site. Specific grade level breakdowns were not used for confidentiality purposes. Years of experience have been slightly altered for confidentially purposes yet retain general trends to give substance to the data.

Ms. Washington is the principal of the site. She has been at this site for three years after several years as a principal at another site in the district. Ms. Jefferson is a teacher identified as an inexperienced user. She has been at this site for five years and has five years teaching experience. Ms. Lincoln is an inexperienced user, a teacher, and has been at this site for six years. The following three teachers were also identified as inexperienced users. Ms. Reagan has been at this site for fourteen years and has eighteen years of total educational experience. Ms. Adams has been at this site for eight years. She has worked for the district for a total of twelve years. Ms. Kennedy has been at this site for eight years and has eight years of total educational experience.

Other respondents, not identified as inexperienced technology users, provided data for the study. Roles served by these individuals included classroom assistants, the librarian, and special program teachers. Most had been with the district for several years but had been at this site for less than six years.

Ms. Johnson is a teacher with ten years of district experience and three years of experience at the site. She has been identified as an experienced user. Other experienced users include: Ms. Truman, a thirteen year veteran with seven years at this site; Ms. Nixon, a twenty seven year teacher with thirteen years on-site; and Ms. Roosevelt, a fifteen year veteran with six years at this location.

The technology trainers interviewed for this study qualified as experienced users. Two had less than four years in the district as classroom teachers. The other trainer had

over ten years in the district as a classroom teacher. Two of the trainers were in their first year as technology trainers.

The School and Technology

Starway Elementary School has four identified technology patterns. One pattern revolves around the multimedia systems purchased through the Title III grant. Another pattern is found in the computer lab that serves the Integrated Learning System. The third pattern is use of PC JRs distributed in classrooms for supplemental activities. The final pattern is one grade's use of donated computers. Other auxiliary patterns include parents who bring personal computers from home for use in the classroom and teachers who bring personal computers from home. Additionally, the Parent Teacher Association is becoming more involved with technology, managing the school web page and producing the school newsletter.

Expectations for schools receiving Title III funds are: (1) commit a minimum of ten teachers to initial training, (2) have a principal commit to technology training, (3) have teachers agree to attend on-going training, (4) have classrooms serve as models for other schools, and (5) have teachers develop units and lesson plans using technology. Additionally, principals agreed computers would not be available to staff until they had successfully completed the five-day training. Computers were not released to the schools until a minimum of ten teachers and the principal had been trained.

The COWS are used for a variety of activities and applications. Some teachers have purchased a number of software applications targeted at particular age level students.

> I buy software with the points I get from my book club. These kids buy quite a few books and things. When I get enough points, I get another

> piece of software. Most of what I get is pretty good or at least I think so and the kids think so. Much of what came with the COWS...we can't use anyway. Or at least the kids can't use it alone. It's too advanced content-wise for the little ones. (Ms. Lincoln, Field Notes, February, 1999)

Other teachers are searching for applications for specific purposes. A number of teachers mention using the reference resources on CD-ROM for research purposes.

> ...the more we used it, the more the kids wanted to use it...not too long ago we were studying birds and mammals and we went and we each looked up an animal on the encyclopedia and they got to see the sound bytes and the pictures. They just thought that was wonderful. It just totally reinforced everything that we had just talked about in the classroom. (Ms. Jefferson, February, 1999)

Teachers in the middle grades use the systems for drill, practice activities, and to create new learning activities.

> I'm trying to find early versions of ClarisWorks that will work on these old computers. The new version won't run on them because it is so big. If I can find an older version, I can teach them to do slideshows and word processing. I have it on my COW, but that's only one computer. If I can get it loaded on all these...then I can really do something. (Ms. Nixon, Field Notes, January, 1999)

Students in one class put most of their reports in a presentation format. Graphics are taken from a digital camera and placed on a disk. Students share the disk to download particular graphics for specific presentations. Teaching units using simple animation are also being developed to support study of prefixes and suffixes in another class.

> We use it to support our Core Knowledge stuff. We use Web TV to research certain topics in our Core Knowledge curriculum. That's where we get a lot of our real interesting stuff. We take pictures with the digital camera to add graphics to the pages. It looks real funny to see us do it. I'll get up on a table and have a kid hold a book down on the floor. I'll lean out over the book and shoot the camera straight down at it. I can get a pretty good picture some of the time. (Ms. Truman, January, 1999)

> We're in PowerPoint right now, I'm having the kids make their own suffixes and prefixes using that material...the prefix shoots into the root word and the suffix shoots into the root word...they learn how to do that

too. In other words, they're applying what they've learned. (Ms. Truman, January, 1999)

The COWS are modern, multimedia capable systems. A significant difference between these systems and others in the building is CD-ROM capability. These machines also have speed and capability to access the Internet, although no Internet services are available at the present time. No printers are in evidence with the systems.

> We don't have access to a printer right now so that's another big glitch...if you have no printer, you have removed about fifty percent of the usefulness of the computer. And we have no printer accessibility. Now, that's foolish. (Ms. Jackson, January, 1999)

The systems, although designed to be mobile, appear to be primarily used as fixed station. Lack of wall outlets limit the number of places that computers can be placed in classrooms. In one location, only two outlets were observed and one of these was directly over a sink. (Field Notes, January, 1999). No systems were observed being moved between locations. Additionally, portable classrooms are not allowed to keep systems in classrooms overnight due to security concerns so systems were not observed in these classrooms on a daily basis.

The use of the systems has been sporadic throughout the building. Logistical problems exasperated the situation when machines did not arrive on schedule, and federal funding for Internet connectivity was delayed. The busy nature of teaching reduced time available to practice on the stations.

> ...I was guilty that I didn't use my COW in the very beginning. Then, once I really got to thinking about it...it's stupid...it's sitting over there. So, at first I just started using the disk and letting the kids do the little games and stuff on it...then, the more we used it, the more the kids wanted to use it. (Ms. Jefferson, February, 1999)

> These new machines have the capacity to do what I want to do with technology. I can teach kids how to use the programs to do work for class.

> They can have...products when they finish that they will be proud of. I couldn't do all that in the computer lab. All they did there was punch buttons... (Ms. Truman, January, 1999)

The computer lab was recently moved to its present location from a smaller room. District staff built a permanent wall to separate the new location from the library. In the center of the room, is a large open square of tables. Three computers sit on each side of the square. Five long plastic tubes push down from the ceiling, providing power to the computers. A jumble of power strips and power cords rest, spaghetti like, on the floor at the center of the square.

On the wall adjacent to the library, sit six computers. On the opposite wall are two tables of three computers. An inkjet printer, stacked on two cardboard boxes, is between the two tables. All computers display the same opening screen, a winter graphic with scrolling text beneath.

Three ceiling tiles have been removed and cables drop from the ceiling. Bright conduit is fastened to the wall, demonstrating recent electrical work. On the interior wall is a large set of permanent cabinets. Stacked in this area is a combination of old equipment. On top of the cabinet is the server for the stations in the lab (Field Notes, January, 1999).

The server provides the software for the stations. A series of lessons on reading, mathematics, and language arts is the basis for the system. Students take a series of prescriptive tests upon entry into school. This provides the baseline data for other lessons. The students log on to the system and a screen appears that lists a set of lessons. Students complete the assignments and the system's management functions track progress.

Teachers are able to structure the level of mastery, call for reports, and manage the system.

Three primary uses of the lab were noted. One involved using the diagnostic and prescriptive capabilities of system to guide students through a sequence of lessons based on mastery of content. The majority of teachers used the lab in this manner. Another use involved modifying the sequence of lessons to meet instructional needs.

> I went through our manuals and picked out the essential skills and different skills that I need for them to go over. I created a set of essential skills for first quarter, essential skills for second quarter and so on...It seems like it is staying with them a bit longer and they are enjoying it more...I've also created different things for multiplication and rounding. I went through and picked up the different grade levels that have rounding. That way some kids can advance and the others are working at grade level. (Ms. Nixon, January, 1999)

The third use observed involved loading an older version of PowerPoint onto each computer so that this application could be used to teach PowerPoint in the lab setting. The older version was needed due to hardware limitations and the proprietary nature of the Integrated Learning System.

> I want to use the lab to teach PowerPoint. I only have the COW and that one machine isn't enough. I can teach a few of them to use it that way but there is no way to do anything with my whole class. This way we will be able to learn the basics and then we can rotate through the machine in my room. (Ms. Truman, January, 1999)

Students enter the lab and quickly move to computers. The rattle of keyboards is heard as students quickly type in their user name. Students stare intently at the screen, sometimes mouthing words as they read a problem on the screen. Much of the information on the monitor appears to be text based. The teacher moves from student to student, looking over their shoulder at the monitor.

The teacher moves to an open computer and logs on to the management function of the system. "I'm telling it to print all records at about 3:00. It takes a while to print on that inkjet. By being able to program it to print later I don't have to wait and I'll have the records to look at tonight. I won't have time before then to look over them anyway" (Ms. Ford, January, 1999). On the opposite side of the room, a student raises her hand. The teacher gets up from the computer and move to the student. The student explains the problem. "Okay. Let's take a look. Ah, I bet you missed that clue there. See how they are setting that word off by itself. They are trying to help you."

"Okay, it's time to go." Turn your mouse over, put your chair in and let's line up. We have a lot to do today. Roshanda, will you check and make sure that the everything is as it is supposed to be when we leave?" The students line up at the door awaiting the command to move back to their classroom. The monitors have returned to the familiar winter scene (Field Notes, January, 1999).

Teacher behavior varies in the lab. There is one corner of the lab where most teachers place their papers and supplies. Some teachers sit at this station and remain there for the entire period, grading papers and working on lesson plans. Other teachers sit at this station but move to answer questions and take care of problems as needed, returning to their own work when convenient. Other teachers never sit at this station, constantly monitoring the room and helping students (Field Notes, January, 1999).

This school has always had a legacy of some type of computer lab. The PTA purchased twenty-five early desktop machines (PC JRs) to equip a lab. Members of the Parent Teacher Association volunteered time to manage the lab, limiting teacher involvement. "From what I have been told, most teachers just took their kids to the lab

and dropped them off or sat in there and watched them. They really didn't interact with the machines much" (Ms. Washington, February, 1999). At present, the PC JRs are spread throughout the building in various classrooms. The machines have been passed from classroom to classroom. The computers are primarily used for drill type activities targeted at basic skills in math, reading, phonics, spelling, and general skills.

Teachers appreciate the machines because of the ease of use and the dependability of the platforms. "See, with those in here...I don't worry about the lab. Something is always wrong with the lab. Some of the machines are always down...The PC JRs are easy to use anyway" (Ms. Lincoln, February, 1999). Another user mentioned the software on these machines matched teachers' needs better than recently purchased software.

> ...one reason they like that is that they have had intensive training on that. ...they say a lot of stuff on those is geared toward the essential skills that they do with their people...they're real comfortable with it and are able to use it. (Ms. Truman, January, 1999)

There are three third grade classrooms with numbers of donated computers. In the first classroom are found five 386 computers, one 286, and one COW station. The 286 is a machine the teacher brought from home and is connected to a printer. In the second classroom, the back of the classroom has been turned into a mini-lab through the addition of six 386 computers. On another table are three other machines. She believes these can be repaired and given to another teacher. At another table is a personal computer where the teacher stores her gradebook and some other programs. This area also has a station that is connected to the computer lab, allowing access to the Integrated Learning System and computerized reading test series. On the end of the tables is the COW station. The third classroom has six 386 computers spread across the back of the room. This teacher also has a station connected to the computer lab. At the front of the room are two more

386 computers. All the 386 computers use DOS-based programs that target specific skills through game like activities and multiple choice answers.

This group of teachers has spent considerable time refurbishing these machines for instruction. Hard drives have been reformatted or donated hard drives installed in the machines to increase storage capacity. The teachers have located a large amount of software for these machines. Considerable time is spent on maintenance to keep the machines operating.

> If I can find a time to meet with the guy that's helping me with these systems...hopefully I can get that new hard drive installed and working. I'll use the forty that we take out to put in that machine [points to a computer] and make it an eighty. That way I'll have enough room to install Office or ClarisWorks and use those programs with the kids. (Ms. Nixon, Field Notes, January, 1999)

Starway, the School

Starway Elementary School is one of more than sixty elementary schools in the Oakway City Public School district. The district offers Early Childhood services through graduation from High School. Supplemental and special programs are available throughout the district. Specialty program populations have grown dramatically over the past ten years. The percentage of students eligible for free and reduced lunch services has grown as well. ([Oakway] City Public Schools, 1998c).

Slightly less than forty thousand students make up the district. Ethnic composition of the district is thirty-six percent Caucasian, forty percent African American, sixteen percent Hispanic, and five percent Native American. This contrasts with a state average that is sixty-nine percent Caucasian, eleven percent African American, four percent Hispanic, and fifteen percent Native American.

Average household income is below the state average, making the poverty rate and unemployment rates higher than the state average. Seventy-nine percent of the district students qualify for free or reduced lunch services, well above the state average of forty-six percent. The district also has a high percentage of single-parent families and more teen mothers that do not receive a high school degree. The percentage of adults with a college degree is above the state average (Office of Accountability, 1997).

Starway Elementary School's demographics reflect a smaller percentage of Caucasian students (25.3%) than the district average (36%). The percentage of African American students is significantly higher (65.2%) than the district average (40%). Percentages for Native American and Hispanic students are below the district average. Starway has a high attendance rate (95.6%). The percentage of students qualifying for free and reduced services (50.6%) is considerably below the district average (79.5%) ([Oakway] City Public Schools, 1998c).

Starway Elementary School is a Great Expectation and a Core Knowledge school. The school also participates in the Oakway Networks for Excellence in Education (O.N.E.) program. The school participates in the district Essential Skills program and the state testing program. A schoolwide Assertive Discipline program is in place at the site.

The Essential Skills program is a district-designed and implemented Criterion-Referenced testing program. Administered quarterly, the program tests skills at each grade level according to specific standards. Score results are used in combination with other factors to determine promotion decisions. The district also requires additional testing for diagnostic purposes in reading.

The state requires that third and seventh grade students be tested in the spring with a standardized achievement test (Iowa Test of Basic Skills). This norm-referenced test specifically measures skills in reading, language, mathematics, science, social studies, and sources of information. Students in grades five, eight, and eleven are assessed with a criterion-referenced test designed to measure skills in writing, mathematics, reading, science, U.S. history, constitution, government, and the arts. Skills and concepts in these content areas have been identified as part of the core curriculum called the Priority Academic Student Skills (PASS).

The Great Expectations model espouses to use the "very best of what is known about teaching today" (Great Expectations, 1996, p. 3). The model draws on multiple learning theories based on: (1) a climate of mutual respect, (2) high academic and behavior standards, (3) the development of positive self-esteem, (4) high expectations for success for all students, (5) the development of teacher knowledge and skill, and (6) the development of positive teacher attitudes and responsibilities.

Standards are listed for Great Expectations schools. These are:

1. Create a learning environment that expects success
2. Recruit personnel that believe all students can learn
3. Set high expectations for staff and students
4. Insist staff and students accept responsibility for personal behavior and develop plans for improvement
5. Build positive self-esteem in staff and students
6. Provide daily opportunities for students to speak in complete sentences, recite the school creed, and function in a manner that enhances self-worth
7. Actively involve teachers in guiding student learning
8. Promote the use of integrated curriculum, including classical literature and phonics
9. Provide an atmosphere of respect. (Great Expectations, 1996, p. 4)

The Great Expectations program for the Oakway City Public Schools began in 1991-92. At that time, the superintendent closed the seven lowest performing schools and re-opened them to hire new staff members for school improvement efforts. During the summer of 1995, the district began a training program for the Great Expectations methodology. To date, over five hundred district employees have been trained. During the 1995-96 school year, the district established criteria for district recognition as a Great Expectations school. To qualify, eighty percent of teachers must agree to participate in the program, and the principal must commit to full implementation of the program.

This school is also known as a Core Knowledge school. "Central to the Core Knowledge curriculum is a knowledge of classical literature, mythology, and the relationship between the English language and other languages" ([Oakway] City Public Schools, 1996, p. 3). To become a Core Knowledge school, the school must: (1) have a principal sign a memorandum of commitment and agree to take the Core Knowledge for principals training, (2) have eighty percent of the teachers sign a memorandum of commitment to implement the program and be trained, (3) hold a minimum of two Core Knowledge training sessions, (4) hold one parent meeting to explain the program, (5) have teachers agree to teach one Core Knowledge unit during the year, and (6) devote fifty percent of the school day to Core Knowledge content. Continued participation in the program requires increased support and implementation. The program began in Oakway City in 1992-93. The summer of 1994 saw the beginning of district training efforts. To date, over seven hundred district employees have been trained ([Oakway] City Public Schools, 1996, p. 3).

The Oakway Networks for Excellence in Education (O.N.E.) is a collaborative effort between a major university and school and community members. The purpose of the network is to provide a forum for discussion to make learning meaningful for students through principles that emphasize networking, shared collective vision of student learning, shared decision making, shared leadership, and shared responsibility for all student learning ([Oakway] Networks for Excellence, 1996).

District Training Facilities

A trip "downtown" is needed to visit the district technology training facility. Near the district administration offices are many red brick buildings that once formed the mainstay of a thriving commercial district. The faded remainder of past billboards and painted advertisements remain on the sides of some of the buildings. Interspersed with the larger buildings are pockets of small, wood frame houses. The district administration building, made of the same red brick characteristic of the area, is an old high school that was converted into offices. The parking lot is full and many cars are parked on the narrow streets surrounding the building.

Double glass doors lead inside the building. Visitors are required to register at the front desk and obtain a clip-on identification badge. Seated away from the desk in a central location is a security guard in uniform. The door into the curriculum and instruction area is across a large entryway. The main desk guards what was once the gymnasium. The brick walls have been painted white. Huge windows, sitting about ten feet off the floor, dominate two walls. A huge three-dimensional map of the state, with mountains in graphic relief, covers one wall. The shiny brightness of recent ductwork can be seen in the pipes and girders of the high ceiling. Located in the cavernous room are

dividers and bookcases separating various work areas. In total, fifteen to twenty district employees work out of this one area.

Immediately to the left of the entrance is the technology training area. A training session is underway. Over the ringing of a distant telephone, the trainer can be heard telling a teacher, "That doesn't hurt a thing. You just have two different versions of Netscape open at the same time. See how this one is covering up the other one. All you have to do is close this one out and you are back in business. Don't worry, that happens all the time...to all of us." (Field Notes, January, 1999)

Around the corner are thirteen computers, apparently the same make and model as the COW stations, sitting in a U shape. The other side of the U is dominated by a presentation station and two printers. Wheeled office chairs sit at most stations. A large fan is blowing air over the small group of users.

Three of the teachers are out of their seats offering advice to another teacher. The trainer, finger pointing to the screen, is explaining a point about search operators to another teacher. A teacher, using the wheeled chair, rolls to the side of a friend and points to a site offering lesson plans. The trainer moves to another teacher and asks what they have been able to find on the topic they are trying to research.

The users work both cooperatively and individually. The small group in the middle of the room are sharing information on how to convert a WordPerfect document to Word. Others work without looking at anyone. The trainer moves to an upraised hand. The user turns around, smiles and asks the question, "How do you get sound from the Internet?" The trainer points out an icon on the screen and replies, "You need to get that file. Right click on that icon and get a menu. Yes, that's right. Now scroll down until you

find...Save Image As...Yes, you have it now. Click on it and we'll save it to the desktop." (Field Notes, January, 1999)

Conversations

Teachers and technology trainers were interviewed for this study. Teachers were identified as experienced or inexperienced users of technology, establishing two groups. The district technology trainers formed the third group. In the following section, beliefs are organized by the categories; teaching, learning, and technology. Each section will be organized to discuss beliefs common to both groups of technology users and beliefs unique to a single group. Trainers will be presented separately.

Teaching

Teachers talked about the tremendous responsibility they felt to provide exceptional educational opportunities to students. Discussion centered on curricular content issues and modeling provided to students. Teachers indicated, in very clear terms, that they understood they are "on stage" throughout the school day.

> Kids look at everything we do and say. That's a big responsibility to shoulder. I think there is a tremendous amount of responsibility for me as a teacher to make sure that my students don't just see one view of the world...(Ms. Roosevelt, January, 1999)

Responsibility included instilling attitudes about learning and the importance of education. "If I take it personally and show that I'm interested in an education...I put my degrees from college and other honors up here. I show a pride in that..." (Ms. Nixon, January, 1999).

Teachers also emphasized the importance presentation style plays in influencing students. Teachers discussed demonstrating passion about their subject matter and excitement about the job. Terms used to describe this feeling were excitement,

motivation, enthusiasm, and interest. "The motivation...if a teacher comes into it without motivation or interest, the students will just lay back and probably not pick up on it...not be interested in it" (Ms. Nixon, January, 1999).

> I think it's important for them to know that you like your job...It's important for the kids to know that you want to be there...and if they know that you want to be there that makes them want to be there. And if you want to be there, you're going to be more excited about bringing new things into your classroom...new ideas...new technology...lots of new ideas. (Ms. Jefferson, February, 1999)

Teachers discussed the importance of establishing strong relationships, based on mutual respect and concern, with students. Emphasis was on relationships that forged a connection between teacher and student, making the task of teaching and learning easier.

> ...it's very important to establish a respect and for that child to understand that you care about them. They're more likely to learn from you if they don't have that in the way. If the relationship is poor between the teacher and the child, they're much less likely to learn...(Ms. Nixon, January, 1999)

The importance of the relationship between teacher and student must not be minimized. For some, this relationship established a reason for teaching.

> I'm not in here for the money. If I were, I'm in the wrong profession. Part of the perk that I personally get from teaching is being with the students and seeing them learn...helping them learn...that's a good thing. You get a rhythm going in your class and the kids start learning what to expect... (Ms. Roosevelt, January, 1999)

Establishing strong relationships between students and teachers involved establishing a classroom climate where students felt comfortable and safe. As one teacher said, "...they feel comfortable making mistakes...We don't laugh at one another. Mistakes are allowed when they are learning. It's how we learn" (Ms. Jefferson, February, 1999). Echoing this sentiment, another teacher stated, "...whenever they are put in an environment where they feel safe enough to question...and they get enough

positive feedback...then, they want to keep learning. I think it's that whole environment that they're placed in...it's what makes it possible" (Ms. Roosevelt, January, 1999).

For these teachers, external factors were perceived as causing increases in the overall work load in various ways. The most obvious changes were expressed as decreases in teaching time and increases in nonteaching activities. Increased responsibility for documentation and increases in numbers of programs contributed to this problem.

> Paperwork is probably tenfold or more...I think that's one of the things I remember when I first started teaching. I didn't have to take papers home to grade...I could pretty much get everything done during the school day or, if not during the day, I could spend a half hour after school and I was all caught up... (Ms. Roosevelt, January, 1999)

Teachers agreed classroom environments that fostered learning were critical to the overall success of the classroom. Variation existed between classrooms, but the overall emphasis was on learning. Teachers used various methods and techniques to ensure learning. Common were realizations that increased standardization to meet numerous mandates translated into loss of opportunities for personal teaching styles and characteristics.

> I used to be able to do a lot more art. I used to be able to read to the kids a lot more. I have to make time to do it occasionally now because I think it's important...we don't get to do it on a regular basis and that is sad because those are the things that I remember about my childhood. (Ms. Roosevelt, January, 1999)

Teachers discussed teaching in similar terms. For these teachers, teaching centered on student learning. Teacher directed learning episodes were favored. Standardized activities that emphasized teacher control were commonly observed. Mention was made of increased emphasis on standardized test scores. The familiar model

of teacher directed explanation, seat work, and testing was observed in most classes. Teachers used manipulatives and other aids to enhance teacher presentations.

Variation between the groups on matters of teaching appeared to be a matter of personal preference. No strong trend emerged for either group. Teachers from both groups were observed using structured activities and exploratory activities. Some emphasized Core Knowledge activities while others emphasized textbook activities. Preference for certain content areas were noted across users. Although most teaching was teacher directed, wide variation existed in how this was implemented in classrooms.

Teachers frequently mentioned lack of teaching time. The crowded curriculum and multiple programs in place at this site were perceived as fragmenting available time. Absence of time to reflect on practice was mentioned as problematic, leading teachers to believe that increased structure was the only solution.

The technology trainers discussed teaching in terms similar to teachers and talked about the similarity of issues in classrooms and training sessions. A major teaching issue became motivation and instruction for learners with widely ranging ability levels. Trainers identified large discrepancies in technology knowledge and skill development among teachers. "...we've got one teacher that can't use the mouse and we've got another that is so advanced that he or she is trying to tell you how to do the program" (Ms. Hoover, February, 1999).

Time issues are teaching concerns to trainers. Traditionally, teachers leave the classroom during the school day or train on personal time (i.e., after school, Saturdays, or during the summer). Trainers realized this meant teachers were unable to give their full attention to training sessions. "They have a lot on their plates. When I come in there, they

look at me as serving them one more something that they don't need...because they are feeling overwhelmed" (Ms. Hoover, February, 1999). Trainers reported differences in how building level administration valued training seemed to influence how teachers felt about time commitments to training.

To meet demands of training a wide range of learners at less than optimal times, trainers reported preparation was key. Well-prepared lessons were goals of trainers. Characteristics of lessons included explanation and experiential learning exercises. Trainers demonstrated knowledge and understanding of multiple learning styles.

> ...preparation is number one. The things that we talk about in Trainer of Trainers...being competent in that particular area...getting teachers to use those particular skills...giving them as much hands-on experience...I try to make sure that nobody leaves out of here feeling that they didn't get much out of that. (Ms. Eisenhower, February, 1999)

To balance content issues and create a learning climate, trainers expended effort developing rapport with learners. This meant trainers presented a relaxed demeanor designed to build trust in training and created an environment where learners felt free to risk learning mistakes. Trainers talked extensively about creating conditions designed to put learners at ease. "...I'm very positive. When I approach each person, I want them to feel from me that they can do this. It's okay to make mistakes...making mistakes is part of learning" (Ms. Hoover, February, 1999).

Trainers wanted to develop the belief, among participants, that trainers were available to offer assistance. Instances were mentioned of trainers going beyond the requirements of the job to aid users. The trainers, all classroom teachers at some time in their career, realized the demands of teaching.

Learning

Curiosity was seen as the internal drive that provided motivation for students to learn. Education was seen as fostering curiosity through introducing new concepts or revealing and developing existing curiosities. Experienced users discussed self-challenge and self-improvement issues as significant. Learning, to this group, included an internal locus of control. These teachers saw themselves as guides for student learning, providing motivation and content to excite self-driven learners. Inexperienced users placed responsibility for learning on the learner.

Each group used multiple methods of instruction to reach students. Mention was made about presenting material in multiple ways due to different learning styles in classrooms. One teacher mentioned, "...hopefully the teacher will use all the different types of learning styles or many of them...auditory, visual, and kinesthetic to help these kids learn in ways that will encompass all the classroom's needs" (Ms. Jackson, January, 1999).

Trainers discussed learning in relation to motivation, indicating some internal drive responsible for learning. The trainers also talked about internal drives being different across learners. "They don't want to be there...they are not motivated...they don't think they need it" (Ms. Hoover, February, 1999). This led to discussion of self-regulated learners. "We run into teachers that are very advanced learners. They take every class that we offer and then go to training out of district. They seek out training and don't wait for it to come to them. We try to have a lot of offerings but some of these users are beyond what we offer right now" (Ms. Bush, February, 1999).

Emphasis on self-regulated learners was balanced by discussion of reluctant learners. "If you go to a building and it's that after-school thing...those teachers are really busy and the last thing they want to do is hear me talk for an hour" (Ms. Hoover, February, 1999). Trainers were in the unique position to see members of both groups at any training session. Teachers were required to obtain staff development hours, meaning that some learners were in training sessions only because it was required.

Learning was also discussed from the concept of depth. Trainers mentioned learners must get beyond the surface functions of using technological skills to issues of how to use technology in schools. Trainers expressed sharing information of this sort with teachers during training sessions.

> I think that what I've come to believe about it is that people have to get beyond the bells and whistles to some degree. It's kind of a balancing act...remain excited about the technology but then harness it and temper it so that it is still a tool... To those people who are using it and have a game plan interwoven into their lesson plans and objectives...that's a whole different level of teaching...that's using it properly and appropriately. I think that's kinda what a lot of the focus in training probably needs to be...on proper use...over use...under use. The appropriate use of being able to tie it into your lesson plans and incorporating it into their teaching. They feel trained and competent enough that they grab it just as they would the overhead. It's a tool...it's a resource. (Ms. Eisenhower, February, 1999)

Trainers reported learning was more complex than processing isolated skills for recall at appropriate times. Trainers wanted teachers to think about technology and accept or reject it as a tool to improve schools. Trainers realized it was impossible to teach all skills to all teachers.

Technology

Common to teachers were beliefs about the importance of technology in schools. Both groups discussed technology as a large part of today's world with potential for an

even larger role in the future. Consequently, teachers see part of their job as preparing students for this future world by allowing exposure to technology. Technology was discussed as permeating society and not restricted to employment or school settings.

> I think my job is to train these students to be able to live in the world that they'll have to live in. Part of that is that they're going to have to be more comfortable with technology...that they learn not to be afraid of it. So, even if it's not exactly the same program or used in the same way as when they get to be an adult...they're going to be comfortable enough with technology...I think it's just building that mindset. (Ms. Roosevelt, January, 1999)

Technology was viewed as a way to instruct students in alternative ways and a different way to deliver instruction, valuable because students responded to technology in a positive manner. "Computers are a different medium of delivery of curriculum. It's one medium that reaches a few more students. Any medium that works is a valid one. (Ms. Roosevelt, January, 1999). Teachers mentioned that students enjoyed working with computers. "The success is that all the kids are wanting to work on them. Some didn't even go close to them in the beginning and now they want to work on the computer. (Ms. Lincoln, February, 1999).

More variation was observed between the groups regarding present uses of technology. Inexperienced users expressed satisfaction with the computer lab's Integrated Learning System. Experienced users' opinions about the system were mixed. Positive comments indicated belief in the importance of review and practice sessions. Negative discussions revolved around frustration with the repetitive nature of the experience, content of the lessons, and the proprietary nature of the system. These users wanted to use computers for other purposes and felt limited by available options. Both groups suggested they would like to have access to similar management systems in classrooms.

"The lab is nice but I would use it more if I had it here all the time. That way, I could have some set up and use it as a discipline reward and at the same time they'd be learning" (Ms. Roosevelt, January, 1999).

Inexperienced users used computer systems in classrooms for research and reference activities. Student use of commercial, skills-based software was common. Experienced users used computers for these activities and used software to create presentations and exercises to reinforce classroom activities. Students were allowed to explore on computers more often in these classes.

Trainers talked about technology in different terms from the teachers identified as experienced or inexperienced users. The language was more holistic, concerned with general trends and issues. Trainers talked about skill-based training but most discussion was directed toward encouraging teachers to use technology in the classroom to teach.

One of the things trainers discussed was forcing teachers, in limited ways, to include technology in teaching. Trainers saw such measures as necessary to encourage reluctant users to use technology. Training without some form of accountability system for implementation in classrooms was viewed as counterproductive.

> ...She included, in her criteria for her teachers in the building, that they show her how they were using the computers in the classrooms...they would write those into the lesson plans. That was how the teachers were being held accountable for using those computers as a tool to increase learning. (Ms. Hoover, February, 1999)

Trainers also showed definite opinions about the use of technology in schools. Distinctions were drawn between the use of technology and proper use of technology, as defined by the trainers. Conversation centered on the use of technology as a tool for teachers. Delivery of information and use of technology to create products were

frequently mentioned. Trainers cautioned about the seductive nature of technology. "It's kind of a balancing act...remain excited about the technology but then harness it and temper it so that it is still a tool" (Ms. Eisenhower, February, 1999). Belief was demonstrated that technology touches a variety of learning styles but the real power of technology was the teaching done by teachers to reinforce concepts and skills developed in concert with the computer.

> ...kids don't learn the same way that they used to...they want a faster and more flashy input...multimedia and computers offer that...However, the computer is exactly like a TV in the fact that if you sit an adult or a child in front of the TV and they just mindlessly watch...they don't really process what they are doing. There must be some sort of interaction with another person...if the child sits down with a parent and they watch a program together ...and the parent asks them intriguing questions about what they are doing...they are going to learn. It's the same thing with the computer. (Ms. Hoover, February, 1999)

Frustration was also expressed with current ways that many teachers use technology. Realization teachers were using computer labs to gain more time for paperwork was troublesome to trainers. In a similar vein, trainers realized certain district technologies were not used as designed and this misuse had lessened the impact of programs. Trainers strongly presented belief that teachers must teach alongside the computer and use it to reinforce existing strategies and curriculum.

> ...It is one of those things that can be easily overused. The pre and the post testing...the students already have a hard enough time taking these tests over and over and over. If you don't put some teaching in between it and really look at those reports and really utilize it...Of course, I think that's the bottom line with any of them...unless it's used properly.
> (Ms. Eisenhower, February, 1999)

> Right now we've got way too many teachers that are using the computer labs as drop off times so they can go and do their paperwork. Those teachers need to be there, standing behind the student...asking them questions about what they're doing. If that's not being done, then the

> computer is not being used to the full extent of its capability. (Ms. Hoover, February, 1999)
>
> I want them to realize that it's not just down time and really think of it in terms of on-task, beneficial learning time...If you can kinda answer that happy medium in between where you're not over using it or under using it and it's always driven by a purpose and a curriculum. Then I would say you're getting the most benefit. (Ms. Eisenhower, February, 1999)

Trainers demonstrated an understanding of the world of teachers. They realized teachers needed enough information to get started with technology but too much information confused beginning users. Trainers also realized teachers became comfortable with technology by using it. Relating this back to a personal learning style, one trainer stated, "I have to sit down and do it. I feel like making mistakes, believe it or not, is the way I learn in technology..."

Summary

This chapter provided a description of the school district, the school site, and district training facilities. Description provided the reader with understanding of the physical setting of the case. Teachers and trainers were also profiled. Divergent uses of existing technology emphasized technology was being used in different ways by different people to accomplish different goals.

Descriptions of information obtained through interviews, document review, and observation illustrated differences and similarities in the beliefs of three groups of technology users about teaching, learning, and technology. The three groups were identified as experienced users, inexperienced users, and technology trainers. Beliefs common to two or three groups were presented. Elements unique to any one group was also presented.

CHAPTER V

ANALYSIS AND FINDINGS

The previous chapters explained the purpose of this study, provided a review of relevant literature, presented the methodology that guided this study, and presented data to describe the case. This chapter provides findings and analysis of the data. To aid this process, data are organized into categories reflecting personal beliefs, professional beliefs, organizational beliefs, and societal beliefs.

Personal Beliefs of the Groups

One part of the conceptual framework presented for this case deals with personal knowledge unique to teachers. Elbaz (1981) identified three types of personal knowledge. Content knowledge is personal knowledge about "what" is taught (subject matter and curriculum) and "how" it is taught (instruction, self, school). Orientation knowledge deals with factors thought to optimize the teaching experience for the teacher. Structural knowledge provides rules to routinize decision making.

The Elbaz model suggests teachers possess specific knowledge to respond to uniquely personal teaching situations. For the purposes of this study, personal beliefs about teaching and learning will be defined as beliefs that can be attributed to the individual through the type of language used (i.e., "I believe..." , "My beliefs are...", "In my classroom...", etc.).

Experienced Users

Experienced users are identified as users with Title III training and additional technology training. Group members were identified by colleagues, by the building principal, and through the interview process. The design of this study clusters beliefs into categories concerned with teaching, learning, and technology. Descriptive categories of beliefs: (1) technical, (2) affective, and (3) structural were established to aid analysis. Technical beliefs about teaching are concerned with strategies used by teachers in personal teaching. Technical beliefs share characteristics with Elbaz's categories of content knowledge and structural knowledge. Affective beliefs about teaching are related to emotional concerns about why teachers teach in certain manners, roughly equating to Elbaz's category of orientation knowledge. Structural beliefs about teaching are related to issues outside the control of the teacher that assist or inhibit teaching. Elbaz's categories do not reflect outside factors to a large degree.

Technical Beliefs

Technical beliefs about teaching emphasized that ideas, information, concepts, and experiences must be presented in ways that were interesting to students. The combination of content, teaching style, and manner of delivery were viewed as critical to successful teaching. Core Knowledge curriculum was perceived as providing varied content in a sequential manner of interest to students and also provided structure for the teachers, clearly defining curriculum areas for each grade level. "Core knowledge can be taught not only horizontally, but vertically...if you follow it you're not teaching the same information. It tells you specifically what you need to cover" (Ms. Johnson, February, 1999).

Delivery methods were varied. Teaching style was a matter of individual choice. "I'm not the most traditional teacher in the world and there are some things that I do that are probably a little unorthodox. I teach in a very creative way" (Ms. Johnson, February, 1999). The two major teaching styles observed during this study were teacher directed teaching episodes and experiential exercises.

Teacher-directed activities formed the core of instructional practices in these classrooms. Variation in amount of direction, control, and instructional goals were noted. Although teachers remained at the center of instruction, variation in teaching style provided a wide range of observed practices. As a general observation, these teachers were less directive and more relaxed in personal instructional approaches. "I'm a facilitator. I teach them how to teach themselves ...I'm here for questions but I don't do the work for them" (Ms. Roosevelt, January, 1999).

Types of learning identified as important or meaningful characterize technical beliefs about learning. Teachers mentioned learning should provide opportunity for application of concepts to real world problems. Experiential learning was favored as providing additional opportunities for application.

> One way of learning this material is to read it out loud from the book and to act it out on the floor. That's what we are getting ready to do today with this book. That way they will learn it more...rather than just reading the material, studying the vocabulary words, taking a test over it, and forgetting it. (Ms. Truman, January, 1999)

Technical beliefs about technology demonstrated experienced technology users believed technologies belonged in classrooms. Teachers commented they looked for ways to adapt curriculum to technology. These teachers have understanding how technology meshes with personal classroom practice. Although differences were noted in

how teachers used technology to support instruction, all teachers viewed technology as important to supporting their classroom goals.

Affective Beliefs

Affective beliefs about teaching clustered into beliefs about learners and beliefs about teachers. Teachers discussed the importance of serving as role models for student growth and showcasing the importance of education. This image demonstrated compassion while running an efficient classroom where students learn. The personal test, for these teachers, was development of an atmosphere where students were able to learn.

Content matter perceived as interesting to students and effective delivery skills allowed teachers to make strong connections with students. Connections between student and teacher were tied to student learning. The teacher used this feedback to determine personal teaching effectiveness. "...part of the perk that I personally get from teaching is being with the students and seeing them learn...helping them learn" (Ms. Roosevelt, January, 1999).

Affective beliefs about students mentioned interest in curricular offerings. Interesting curriculum meant that teachers were able to pace classes to keep students with short attention spans engaged. Such offerings allowed teachers to make greater connections with students. Curriculum allowed feedback and reinforcement as students demonstrated learning.

> I use a lot of books in class that fit our Core Knowledge curriculum. The kids love to read in them. They beg to read in them. This is stuff they haven't heard about and they are interested in it. We read and we talk about what we read. The stories are so much more interesting than just the reading book. (Ms. Johnson, Field Notes, January, 1999)

Affective beliefs that apply to learning discussed beliefs about learners. Learner curiosity and effort were mentioned as motivating factors. Desirable were learners with great amounts of natural curiosity and a willingness to work hard. The creation of a psychologically safe environment where learners felt free to risk mistakes was believed to assist the learner. Technology was viewed as a motivating factor in instruction.

Affective beliefs about technology grouped around values teachers attributed to technology. Technology was seen as a process that gave learners self-confidence and improved self-esteem in some students.

Structural Beliefs

Structural beliefs centered on items perceived to help or hinder teaching. Items listed as aiding teaching were primarily related to climate issues. Administrative support and building climate were mentioned as influential. Barriers related to time issues. As mandates have increased, time allotted for teaching and being with students has been reduced. Teachers desired more time to plan classroom activities and more time for reflection. "I also think that having enough 'think and dream' time is essential to planning. You have to have time to develop curriculum fully and then time to take care of all the little extras that are essential to putting it into place" (Ms. Roosevelt, January, 1999).

Structural beliefs about technology were grouped into current use of the computer lab, mobile technology systems, and time for instruction. The use of the current Integrated Learning System in the computer lab was compared to "electronic worksheets" or "mechanical dittos" by some of this group. All members saw the lab schedule as inconvenient and limiting. The mobility of the COWS was limited due to rules about use

in portable buildings. Time for faculty to experiment with technology and to train students was limited.

Analysis of Beliefs

Themes developed from comments made by the respondents to describe personal beliefs about teaching, learning, and technology are grouped into categories listing technical beliefs, affective beliefs, and structural beliefs. These themes are presented in the following table (Table I). Themes emphasize the importance of climate to teaching and learning. Experienced technology users hold expectations for technology. The issue of limited time cuts across teaching, learning, and technology.

TABLE I

Personal Beliefs of Experienced Users

	TECHNICAL	AFFECTIVE	STRUCTURAL
TEACHING	Interest Building Curriculum Presentation Style Teaching Style Delivery Mechanism Instruction Teacher-directed Directiveness Decision-options Teacher-supported Guided Curriculum Supplemental	Learner Connection to Teacher Engagement Demonstrate Knowledge Teacher Role Model Image Climate	Climate Administrative Support Building Climate Time Time to Teach Time to Plan Time to Reflect
LEARNING	Realistic Application Experiential Independent Creativity	Curiosity Motivational Relationship to Learning Psychologically Safe Risk-Taking	Time Decrease Fragmentation
TECHNOLOGY	Place in Classroom Adapt Curriculum Serve All Learners Various Methods Place in Personal Practice	Self-Esteem	Computer Lab Offerings Mobile Technology Limited Time Experimentation Exploration Teach to Student

Inexperienced Users

Inexperienced users were identified as completing only the mandated technology training for Title III schools. Members of this group were identified by colleagues, by the building principal, and through the interview process. The design of this study clustered beliefs into categories concerned with teaching, learning, and technology. The same descriptive categories: (1) technical, (2) affective, and (3) structural were used to aid analysis. Technical beliefs are concerned with strategies, affective beliefs are related to emotional concerns, and structural beliefs are related to external issues.

Technical Beliefs

For inexperienced users of technology, technical beliefs about teaching were grouped into management features, presentation modes, and traditional beliefs. Discussions of a view of self as a disciplinarian, an authority figure, and an organizer were included in management features. Beliefs about teacher-directed behaviors were strong for this group. Presentation modes primarily supported teacher-directed teaching, including the use of manipulatives and supporting activities. Discussion was directed at traditional teaching strategies, emphasizing the effectiveness of traditional methods. "I hate to see us going away from using penmanship and writing words down on paper. I'd hate to see kids not having to think through a problem on paper instead of on a computer" (Ms. Kennedy, February, 1999).

Technical beliefs about learning were divided into categories of student responsibilities, traditional strategies, and coordination issues. Student responsibilities focused on issues of student motivation and desire. Teachers saw desire as nurtured at home, motivated by teachers, or a combination of parental and teacher efforts. Little

discussion was found on intrinsic motivations for learning. Teachers assumed responsibility for motivating and instructing students, but attributed overall success in learning to student desire.

Traditional methods of instruction were mentioned as important "...if you are always on the computer...the computer does it for you and you don't ever learn how to do that. I think there are valuable things on the computer but there's value in some of the old ways too" (Ms. Kennedy, January, 1999). Observation confirmed traditional methods in these classrooms but also illuminated strategies that were non-traditional. Teachers used a variety of methods to teach, but viewed their personal instructional style as traditional.

Technical beliefs about technology discussed technology as enrichment activities and alternative delivery systems. Technology was seen as useful for supplemental and reference-based activities. Technology was also seen as an alternative delivery source for core area information, primarily through drill activities.

Affective Beliefs

Affective beliefs about teaching discussed the importance of systematic instruction on values. Teachers viewed the value of positive role models as crucial to education. Demonstrated enthusiasm showcased the importance placed on presentation style by teachers. "...whether you have a zest for what you teach...I find that if I'm really excited about something and I really get into it and if I become uninhibited with my subject matter...then they also become that way" (Ms. Kennedy, January, 1999).

Affective beliefs about technology were presented as two groups. The first provided reasons for teachers to consider using technology. The second discussed teacher

discomfort with technology. Teachers discussed student motivation as reason to learn to use technology, recognizing student interest in technology was powerful. Many teachers were uncomfortable with learning to use technology because of fear of failure, frustration with learning a complex skill, lack of time, and lack of a reason to learn another skill. Some teachers viewed technology as another educational fad.

Structural Beliefs

Structural beliefs about teaching were categorized around climate, time and discipline. Supportive colleagues, administrators, and building climate were seen as crucial to the success of teaching. Disciplinary concerns were mentioned as increasingly infringing upon teaching. Time spent toward resolution of disciplinary concerns was time not spent on teaching.

Time was a problem in the school. Teachers felt pressure to do more in the limited amount of time available for instruction. Teachers viewed auxiliary programs as competing for the resource of time. Teachers felt time was becoming fragmented, broken into a series of short teaching episodes. For teachers, loss of time translated into the inability to work individually or in small groups as often as needed. Group instructional strategies favored the fragmented day and were frequently observed.

Structural beliefs referred to the structured nature of the world for young children. Beliefs in this area were concerned with the changing condition of the family. "Those babies are in day care from six-thirty in the morning until six-thirty at night. They go from structured day-care to structured class to structured day-care to a structured evening..." (Ms. Reagan, February, 1999).

Structural beliefs about technology illustrated frustration when technology does not work properly. Limited effectiveness was unacceptable for many teachers. Another issue was the lack of resources that accompanied the initial technology purchase. Teachers believed they needed resources to teach and such resources should work in a reliable manner.

Analysis of Beliefs

In general, this group discussed teaching in a more structured manner. Emphasis was given to discipline, structure, organization, and development of critical values. Time was discussed as problematic, and increased discipline concerns were noted. Teachers mentioned traditional methods of teaching and learning were valuable. Learner curiosity and motivation were seen as interconnected. Technology was seen as enrichment. Frustration was mentioned about equipment that did not operate correctly or lack of teacher ability to make equipment operate.

The following table (Table II) represents the phrases used by the inexperienced technology users to describe personal beliefs about teaching, learning, and technology. These beliefs have been grouped into categories listing technical beliefs, affective beliefs, and structural beliefs. Common themes and disparate information are listed under these categories

TABLE II

Personal Beliefs of Inexperienced Users

	TECHNICAL	AFFECTIVE	STRUCTURAL
TEACHING	Management Discipline Organization Presentation Teacher-directed Teacher-supported Tradition Tested Methods Work	Values Role Model Enthusiasm for Job Joy of Teaching Personal Connection	Climate Administrative Support Staff Support Time Fragmented Diminished Individual Work Discipline Disrespect
LEARNING	Student Responsibility Desire Tradition Value in Old Methods Coordination Textbooks vs. Curricula	Curiosity Motivational Extrinsic Rewards Excitement Presentation Interaction Support of Education Ethic	Time Increased Structure for Families No Time to be Children
TECHNOLOGY	Technology as Enrichment Supplemental Reference Alternative Delivery Core Areas School as Equalizer All Can Use	Teachers Need to Learn Motivational to Students Teacher Discomfort Fear Frustration Fad	Frustration Equipment Malfunction Teacher Can't Operate Need All Equipment

Comparison of Experienced Users and Inexperienced Users

In general the two groups of teachers were very similar. Teachers felt responsibility to: (1) deliver content, (2) teach skills, (3) shape behavior, (4) serve as role models, (5) shape attitudes, (6) develop classroom climate, and (7) emphasize academics. Teacher-centered and teacher-supported behaviors controlled instruction, although wide variation was noted in directiveness. Presentation and teaching style differed within groups and across groups.

Connections between teachers and learners were valued as assisting the learning process. Consequently, both groups stressed the power of modeling to shape students. Modeling was seen as establishing the classroom climate and affecting attitudes, behavior, interpersonal relationships, and academics. Building climate, supportive administration, and cooperative colleagues were viewed as aiding the teaching process.

Time was viewed as a problem for both groups. Fragmented blocks of instructional time and competing programs influenced the amount of time available for direct instruction. Increased documentation responsibilities took time away from teaching. Adequate time for planning and reflection created problems for teachers.

Inexperienced users discussed management issues such as discipline and classroom organizational issues more frequently than experienced users. These teachers also discussed traditional methods of teaching as valuable. Although these teachers were observed using non-traditional methods the language used indicated they viewed their personal practice as traditional. This group was somewhat suspicious of untested methods.

Experienced users talked more about supplemental curriculum and Core Knowledge activities than inexperienced users. Strong belief in the value of interesting and relevant curriculum was expressed. Variation in uses of supplemental curriculum was noted within this group.

Both groups viewed student curiosity as essential to learning. Diminished time for teaching was listed as a problem for student learning. Teachers realized the crowded day minimized student contact with the primary teacher. Inexperienced users directed more focus on student responsibility for learning. This group also focused on family support for education as a determinant for learning success. Traditional methods were mentioned as valuable for learning. Experienced users mentioned the use of activities designed to allow students to apply learning to realistic situations. Creativity was viewed as important in the learning experience. This group talked about the importance of classroom climate to learning, favoring climates that encouraged risk-taking behavior.

Technology was believed to be important for students. Teachers recognized student interest in technology. Groups discussed technology as another way to deliver information and skills. Inexperienced users viewed technology as supplemental to classroom activities and expressed varied frustrations about using technology. Experienced users saw technology as having a place in classrooms and in their personal practice. Technology was used to support specific learning outcomes identified by these teachers. Experienced users expressed frustration with limited options in the computer lab and with mobile technology. This group expressed frustration with lack of time for experimentation with technology.

Differences existed between the groups in years of experience in teaching and amount of participation in technology training. Experienced users appeared to understand their personal practice and use technology to support this practice, understanding how technology meshed with content and style. Although wide variation of technology use was observed, this group consistently expressed belief in technology as aiding practice. Inexperienced users appeared less confident in how technology fit into their personal practice. These teachers were more structured in teaching style and discussed the power of presentation and enthusiasm more frequently. It is possible experienced users are more confident about personal practice and are exploring ways to enhance existing practice. Inexperienced users have established elements of personal practices, appear to be exploring other practices, but appear less confident of the effectiveness of developed practice. Teaching experience, level of technology expertise and exploration of types of practices may account for differences between the groups.

Technology Trainers

Technology trainers had primary responsibility for technology training in the district. The design of this study clusters beliefs into categories concerned with teaching, learning, and technology. The descriptive categories: (1) technical, (2) affective, and (3) structural did not aid analysis and were discarded. Final analysis reflects a single theme, (support) organized into beliefs about teaching, learning, and technology.

Teaching Beliefs

For technology trainers, beliefs about training and teaching were grouped into the teaching category. Beliefs about teaching were divided into presentation style and pedagogical knowledge. Elements important to presentation style included: (1) positive

comments, (2) supportive, (3) use of informal assessments, (4) interest building, (5) develop risk-taking behaviors, (6) hands-on, and (7) trust building. Pedagogical knowledge was discussed as an awareness of different learning styles and techniques to reach those styles.

Technology trainers demonstrated awareness about the complicated nature of teaching. Discussion centered on increased accountability in classrooms and on increased numbers of programs infringing on classroom time. Trainers discussed these as competing demands for teachers' time, creating hardship on the technology training process.

Additional teaching beliefs: (standardization, responsibilities, and site-specific barriers) clustered around delivery of training to teachers. Trainers expressed a conflict between individual flexibility and streamlined delivery of services. Multiple sites with specific needs, district training responsibilities, and special projects contributed multiple responsibilities managed in limited time.

Beliefs about learning indicated technology trainers saw training sessions as similar to classroom settings. Techniques useful to reach learners in classrooms were also useful in training. Trainers demonstrated the belief technology is learned experientially. Discussion also centered on the importance of a risk-free environment where mistakes are used as learning opportunities. Technology trainers were aware teachers often divided attention between training and what was happening in their classroom.

Issues of personal growth and reactions to mandated training were mentioned as additional beliefs about learning. Trainers saw some learners as motivated by interest in personal growth. Time was an issue raised about learning. Trainers recognized time must

be allowed for training. Discussion was advanced about lack of an optimum time for training teachers. Teaching was seen as unlike other professions in relation to time and the demands placed on teachers. Adequate time for practice and processing were also recognized as important to teachers' understanding of technology.

Trainers carried distinct beleifs about technology and appeared concerned about how to present appropriate technological strategies to teachers. Trainers mentioned informing teachers about trends and issues about technology in schools. Trainers mentioned grouping teachers by technological skill level and using experienced users as mentors may improve training.

Belief was advanced that technology must be viewed as useful and important to teachers before teachers would use technology to any great degree. Trainers felt teachers must be convinced technology can assist teachers without unduly increasing workload. Trainers advanced belief that effective and efficient use of technology centered on improving teaching and learning.

Reluctant learners were described as scared and overwhelmed, while accepting teachers were seen as excited and nonjudgmental. Resistance and a general lack of motivation were noted at mandated training sessions. Trainers discussed the personal satisfaction that teaching something, perceived by the teachers as useful, brought to trainers.

Technology trainers discussed lack of an accountability system for technological competency for teachers. Belief existed that reluctant teachers must be forced to learn technology. The current use of computer labs was mentioned as serving teacher convenience. Use in this manner, without teacher intervention, was seen as contributing

to perceptions the systems are ineffective. Trainers saw their job as one of continual support to users attempting new skills and new ways of teaching.

Trainers also mentioned building level decisions impacted the effectiveness of training and site support. Users in buildings under supportive principals requested support for more advanced topics, handled routine tasks internally, and were supportive of training. Trainers also mentioned lack of administrative understanding of technology, the training environment, and the reality of classrooms as barriers to optimum training sessions.

Themes that emerged from conversation with the technology trainers are presented in a format to identify the personal beliefs of trainers. The following table (Table III) represents the themes and phrases used by the technology trainers to describe personal beliefs about teaching, learning, and technology.

Trainers discussed effective presentation techniques, optimum learning environments, and awareness of different learning styles as important to technology training. The trainers carried expectations of technological use in schools. Technology was seen as another tool to present information and motivate learners. Barriers to technology training were also discussed. Trainers talked about training teachers and providing service to the schools. Time was discussed as problematic, as were barriers at the school sites.

TABLE III

Personal Beliefs of Technology Trainers

TEACHING	LEARNING	TECHNOLOGY
Knowledge	Training Environment	Vision of Technology
Presentation Style	Similar to Classroom	Useful to Teacher
Positive & Supportive		No Workload Increase
Informal Assessments	Divided Attention	Training & Teacher Attitude
Interest Building	Between Classroom	Contribute to Success
Develop Risk-Taking	& Training	Mandated Training
Hands-On		Resistance
Trust Building	Experiential Learning	Types of Trainees
Pedagogy		Reluctant
Learning Styles	Self-Regulated Learner	Accepting
Experiential Teaching		Lack of Accountability
Teaching as Complicated Work		Force Reluctant Learners
LittleTime to Train	Time	Current Lab Use
Standardization	Training	Systems Outlive Usefulness
Flexibility v. Specialization	Practice	Trainer Support Ongoing
	Processing	Site-Specific Barriers
		Lack of Vision
		Lack of Understanding
		Technology
		Training Environment
		Reality of Classroom

Analysis of Beliefs for the Groups

Common themes under beliefs about teaching are found in the areas of presentation style and knowledge of learning theory. The experienced users (Table I), inexperienced users (Table II), and trainers (Table III) discussed dynamic presentation styles to capture learner interest as important to learner understanding. All groups preferred teacher-centered behaviors, with traditional and non-traditional strategies in evidence. Presentation and practice were frequently observed. Variation was noted within and across all groups in relation to amounts of directiveness. Experienced users and trainers mentioned sensitivity to the importance of multiple learning styles and learning levels. Inexperienced users discussed belief in the value of traditional methods of instruction and mentioned discipline, organization, and management more frequently. Trainers and experienced users advocated experiential learning and the connection of learning to real world activities.

Common to both experienced users and trainers are expectations about the use of technology in classrooms and schools. Experienced users discussed technology in relation to personal practice while trainers talked about technology in relation to multiple classrooms and schools. Inexperienced users discussed use of technology as peripheral to the daily functions of the classroom. Experienced users discussed technology in terms of enhancing presentation of current curriculum. Experienced users and trainers discussed concerns about how they saw other teachers using technology.

All groups discussed the value of interpersonal connections between teacher and learner. Experienced and inexperienced users emphasized the power of the teacher as a role model for learning.

Beliefs about technology were discussed in relation to the range of emotions experienced by teachers learning to use technology. Inexperienced teachers discussed technology with terms such as fear, frustration, or risky. Experienced users and trainers used terms such as excitement and growth. Inexperienced users talked about technology in terms of equipment malfunctions, lack of adequate resources, and user problems.

Experienced and inexperienced users mentioned beliefs about climate and time as influences on learning. Supportive climate and supportive administrators were discussed by both inexperienced and experienced users as positive influences. Trainers discussed building administration as influencing training. Inexperienced users discussed the increasing amount of time spent on discipline matters as problematic. All groups mentioned lack of time for teaching, learning, and technology as a negative influence.

In general, the three groups were more alike than different in relation to teaching and learning. Multiple methods of instruction were used situationally. Teachers made decisions for instruction based on experience and characteristics of the classroom, content area, time, and numerous other factors. Experienced users and trainers appeared to possess strong beliefs about the use of technology to enhance practice. Inexperienced users were concerned with developing personal practice and technology was not seen as contributing to development. Experience with technology, level of expertise, and teaching experience were seen as contributing to differences in beliefs about technology.

Professional Beliefs of the Groups

Professional beliefs, for the purposes of this study, were defined as pedagogical beliefs teachers were exposed to in teacher preparation programs and professional development activities. Beliefs about how knowledge is constructed, how transfer of

information occurs, teaching techniques, learning theories, and related information are found under these beliefs. For the most part, mention of these beliefs was related to professional development activities offered through the district. For reporting purposes, technology training will be featured as the professional development activity with the greatest impact upon the topic.

Technology Training

The three groups of technology users in this study discussed technology training. Beliefs and interpretations from each group are presented below. Presentation by groups allows similar and dissimilar beliefs to be identified across groups. Discussion is presented that identifies commonalties and unique interpretation across groups.

Experienced Users

Experienced users were uniform in their expression of belief technology training should include hands-on experience with technology. "I'm kinda [sic] a combination visual and kinesthetic learner so if I can touch it and see it at the same time...the more senses that I get involved, the better" (Ms. Roosevelt, January, 1999). This group identified personal learning style and discussed learning style in relation to training. "I'm a concrete learner and I have to see, touch, or build it" (Ms. Nixon, January, 1999).

Experienced users mentioned being continual learners. One user mentioned using personal goals to become "more computer literate" and serving as the school computer manager in order to learn (Ms. Nixon, Field Notes, January, 1999). For these users, technology often began as a learning exercise and became a personal interest. "...I know as I've gotten into it, I've wanted to do so much more. Now I've gotten interested in it and it's pretty much a hobby for me now" (Ms. Nixon, January, 1999).

Belief was expressed that learning was an individual matter. The amount of effort allocated to learning was thought to influence the degree of learning. "I think that goes to the individual and how much they want to put into it" (Ms. Nixon, January, 1999). Learning to use technology required commitment. "I struggled there for awhile learning this stuff. I was frustrated and then, all of the sudden, it made more sense" (Ms. Truman, January, 1999).

This group of users also expressed belief in follow up training to aid development of technology users. Follow up assistance was believed to encourage users to continue to work with technology. These users also expressed the opinion that most users needed to experiment with technology so they could ask informed questions.

> ...like downtown, they'll train you on how to do this stuff and you come back and that's it. You won't use it anymore...What helps me is further training on something that I've learned. What hinders me is when they train us and there is not follow-through... (Ms. Truman, January, 1999)

Along with mention of follow up training was discussion about the futility of training on technology and returning to a school site where technology was unavailable. Having necessary resources on site so practice was possible was important to these users. "...so then I went back to school and had nothing. So I didn't use it and it's forgotten" (Ms. Roosevelt, January, 1999).

Common across these users is a concern for adequate time to learn to use technology. "I wish I had time to sit down and make out slide shows ahead of time... (Ms. Roosevelt, January, 1999). Teachers discussed that attendance at most training required some adjustment to personal and professional schedules. Frequently, extra planning and preparation were required to be out of the classroom. Time was required to train students and additional classroom management strategies were used so the teacher

could spend individual or small group time with students. "My problem is finding the time to get them in there and to train them. To train the whole class at one time to do something is kind of difficult to do sometimes" (Ms. Johnson, February, 1999).

Depth of training content was an issue with these users. Experienced users wanted a great amount of content presented during training. "They'll take us through something but they really don't go in depth. We just skim the surface" (Ms. Truman, January, 1999). "I would like to learn how to do some of the more intricate things so that I could work with my kids and do some presentations with them" (Ms. Roosevelt, January, 1999).

Belief was also expressed that learning to use technology was done through individualized trial and error learning. Training started learners in the proper direction but exploration and practice were also important.

> I learned the digital camera on my own. I took it home and started doing all that stuff...by playing with it. I had to go home and fool with HyperStudio. I had to work with it myself. Finally, I figured that out too...on my own. A lot of this you have to do on your own. (Ms. Truman, January, 1999)

Users expressed belief that many teachers are fearful of computers. To experienced users, this fear reduced the learning potential of other users. Experience was believed to be one way to increase teacher comfort levels. "If you get them comfortable with the computers and it becomes a second nature thing to them...then they will learn better" (Ms. Truman, January, 1999).

Inexperienced Users

This group of users expressed the need for hands-on training in technology. Understanding and appreciation for multiple learning styles was emphasized. Experiential learning was discussed as motivational due to learner involvement.

> It needs to be hands-on and, for me, it has to also be written. I'm a visual and kinesthetic learner. And so, if it's hands-on and I have something written to follow...plus I've heard them tell me what I have to do...I will usually learn it. (Ms. Jackson, January, 1999)

There was also a belief that much initial training is too advanced for beginning users. Although the hands-on, exploratory approach to some of the learning was helpful, many users reported confusion. For some, the pace was too fast, there was not time to process information, and the unfamiliar vocabulary was confusing. Some users reported being overwhelmed with the volume of information.

> ...they walk us through something and then we sit down and do it. Those are the things I feel like I learned well. When the trainer would just get up and show us...I would be lost. There was so much that they were trying to tell us...I think now, if I had the session again, I would learn a lot more because I have used it a lot more. (Ms. Reagan, February, 1999)

These users believed they must have practice in order to use technology. "I think a computer is a hands-on type of thing. It has to be something that you do quite a bit" (Ms. Kennedy, January, 1999). Some concern about being able to use technology seemed to drive this feeling. These users wanted to be sure personal skill and techniques were adequate to make the technology operate in the proper manner.

> ...to have training and to actually have time to come back and use it...to have the opportunity to really sit and use each step that they have taught you. They gave us so much information in the five days that we had our training that by the time that we actually got to come back and use it...you had forgotten part of it. (Ms. Jefferson, January, 1999)

Previous problems with technology increased awareness that technology was not foolproof. Problems with the technology during training were frequently mentioned. "...there was some glitch so we couldn't quite do it all. That is still the most frustrating thing to me about computers" (Ms. Reagan, February, 1999).

> I don't have my gradebook on there because when she came in to help me get it on...there was some glitch. We spent two hours and could not get it set up so finally we just quit. (Ms. Reagan, February, 1999)

Teachers appeared fearful that the technology would fail at the most inappropriate time. "So you gather all these people together and your main thing is this computer that is supposed to work for you and it doesn't. I think that's always a fear that I have" (Ms. Kennedy, January, 1999).

The lack of computers on-site when the initial training was conducted created a situation where these new users could not practice new skills. Time became a problem because the computers arrived after the school year had begun. With students in class, limited opportunities for practice were a concern. Training that required teachers to leave the classroom created a new set of problems.

> ...it's really difficult to do training and have to leave your classroom. This isn't like a job where you just shut your door and then come back in. Anytime you have to leave your classroom and have a sub...it's a lot of work. That was a week long period of time. You had to make sure that your sub knew just what you wanted her to do. So you went downtown and all day did that and then you came back and got most stuff ready for your sub. (Ms. Kennedy, January, 1999)

> The teacher needs time, in some way, whether it's so much training and then practice time downtown or some way to come back and have training time in your own classroom...you need to be able to sit down and do it without having to worry about everything else. It's hard now because when you are out of the classroom, you pay the price when you come back. (Ms. Jefferson, February, 1999)

Inexperienced technology users discussed time in relation to learning to use technology. Formal training sessions may move at a pace that doesn't encourage development of a deep understanding of skills, procedures, and concepts. Limited time for presentation and experimentation translated into surface knowledge of the technology.

Inexperienced users wanted time to practice new skills and time to reflect on uses of the skills.

> ...sometimes you feel so overwhelmed when you are being trained that... they're talking about gradebooks and you've stopped back here putting your class roster on. I mean sometimes you feel like you're totally overwhelmed and that you don't know what to do with the information if you don't have time to process it. Now I realize what my kids feel like... (Ms. Jefferson, February, 1999)

Technology Trainers

Technology trainers talked about diverse problems and situations encountered as part of the job. Responsibilities across multiple schools were different due to the different resources, needs, and knowledge levels of schools. Trainers had different areas of expertise and were used for specialized training and projects. District needs for specific training were dependent upon requests and perceived needs of users. "I'd say that there's such a variety that it's like no two days are alike" (Ms. Eisenhower, February, 1999).

Trainers discussed the needs of teachers undergoing training as similar to the needs of students in classrooms.

> I don't think that an average teacher...is much different from a classroom of children. In fact, they may have a little more liabilities...they may be a little more scared of technology...there's always such a vast personality difference in any training session or in any classroom. (Ms. Hoover, February, 1999)

Training practices reflected procedures observed in classrooms. Strengths and weaknesses of learners were assessed. Whole group instruction, small group and individualized instruction, presentation, guided practice, independent practice, exploration, reading assignments, and other practices were commonplace.

> I will stop from time to time and do a walk through and see where everybody is. If they need me to stop, I'll stop and then I'll go back. There's really not a lot of difference between teaching computers and

> teaching in the classroom. You don't go on...you don't teach people how to copy files and paste and do all this stuff when they don't even know how to turn on the computer. (Ms. Hoover, February, 1999)

The trainers emphasized that teachers were very tentative when first learning to use technology. "As adult learners, they are very reluctant. They are afraid they are going to hurt the computer" (Ms. Hoover, February, 1999). Teachers were also comfortable being the resident expert in the classroom and appeared uncomfortable attending a training in which they possess little expertise. "People really don't want to expose that they don't know a thing about this" (Ms. Eisenhower, February, 1999).

Trainers believed the best way to counter the fear observed in many users was to create a training environment that demonstrated the trainer's concern for the learner. "So I want to get as much participation with adults...let them know that the whole purpose of it is to benefit them" (Ms. Eisenhower, February, 1999).

> When I approach each person I want them to feel from me that they can do this. It's okay to make mistakes...making mistakes is part of learning. I want them to feel comfortable about making mistakes. I'm never going to say, "Oh, no! You did that wrong." It's all a matter of building their self-confidence up...making them feel comfortable. (Ms. Hoover, February, 1999)

Trainers believed that teachers learn to use technology through hands-on activities that allowed exploration and skills practice. Trainers attempted to move learners to hands-on activities as rapidly as possible in the training. Hands-on activities also provided the learner with a degree of control over the pace and direction of the learning activity.

> Because it's been proven statistically that you don't learn the most by just hearing...you don't learn the most by just seeing...it's by hearing, seeing, and doing that you get your highest gains. I think that works with technology. Actually, you can't learn how to do a computer program if you don't do it. (Ms. Hoover, February, 1999)

> ...people get more into it because it is so hands-on and allows them some freedom instead of just sitting back and just hearing a lecture. A lot of times I will try to be general and give them an overview but mainly I want to get them involved in the learning so that they really experienced it more so than just hearing me talk. (Ms. Eisenhower, February, 1999)

Related to a commitment to hands-on learning is the belief that there must be some type of connection to practice. "Usefulness is an extremely high priority. I don't want to waste anybody's time" (Ms. Eisenhower, February, 1999).

Trainers talked about teachers being overwhelmed with the numerous responsibilities of the job. "Teachers are being required to do a lot of things right now. They are being held accountable for test scores and things like that...the principals have put a lot on the teachers in that building" (Ms. Hoover, February, 1999).

Training conducted during the school day required teachers to make arrangements to be out of the classroom. Trainers noted that teachers often split their attention between the training and the classroom. Although a substitute might be in the classroom, the responsibility for the classroom resided with teachers.

> ...they don't feel comfortable and they don't give you their full attention when you go to the building and they don't have class coverage. If they don't feel like they [the students] are being taken care of...then they're not listening to you. (Ms. Hoover, February, 1999)

The trainers discussed mistakes as a natural part of learning to use technology. Mistakes were seen as reinforcing mechanisms for the learning. Mistakes were discussed as coming through experimentation and practice with the machine. Trainers believed that teachers must learn enough about technology to realize they can recover from most mistakes. This mindset encourages risk-taking and further experimentation.

Time for training, practice, and experimentation were needed for beginning technology users. Trainers understood that learners proceed through stages in learning to use technology. Beginning users tended to use technology in ways that are different from more experienced users. Trainers advocated increased time for users to develop their own particular style.

Trainers also passed along beliefs about the use of technology to teachers in training. The theme of these beliefs seemed to be the difference between the use of technology and the proper use of technology. "I try to pass on my beliefs or my vision about how technology should be used and what should be done...not just using technology but using it properly" (Ms. Eisenhower, February, 1999). In this view, technology should be driven by a purpose and used in conjunction with a plan and a curriculum. The goal was to have teachers view technology like other teaching tools and use it when it is particularly useful to illustrate a point or the develop a concept.

Summary

The section on technology training presented how the three groups of technology users discussed technology training. General agreement about how training should be conducted was found among the groups. All groups advocated hands-on, exploratory learning with adequate follow-up training. Opportunity for practice and use at the school site was also presented as important. Major differences were found between the experienced and inexperienced users in regard to the pace of training and the content of training.

The section on personal beliefs established that differences existed between the three groups in relation to beliefs about teaching, learning, and technology, but that

variation also existed within groups. No clear trends emerged from the data about teaching and learning. This may be in part due to the influence of teaching experience or other unanalyzed variables. No clear relationship between beliefs and technology training could be established due to variables such as level of technology expertise, training level, teaching experience, and other unanalyzed variables.

Data from this section of analysis suggests that the groups agree on the structure of training regardless of the types of beliefs held by the group. Interpretations of the structure of technology training appear to be independent of the beliefs held by different groups of technology users. Differences do exist in relation to content and pacing for the identified user groups.

Organizational Beliefs

Organizational beliefs include implicit and explicit beliefs that exist within a specific organization. Erickson (1987) discusses culture as a means for organizations to view reality. The overall culture and beliefs that are part of a particular culture define and shape the organization's understanding.

On the surface, building level beliefs appeared to be closely tied to one program, Great Expectations. This program is advertised as "an eclectic approach to teaching" (Great Expectations, 1996, p. 3). The program advances ideas and beliefs from many theorists, advocating the use of any combination that teaches children.

The need of positive models for students is emphasized through the Great Expectations program. The program suggests that teacher modeling is a powerful influence on student action. Teachers discussed the importance of modeling. Teachers felt the tremendous responsibility to be personally aware of what was said and what was

done in the school setting. "Kids look at us for direction and a model of how things should be done" (Ms. Truman, Field Notes, January, 1999). Teachers realized that interactions, actions, and reactions observed by the students over the course of the day are remembered. "Teach students how to do it, when to do it, and expect it to be done well" (Great Expectations, 1996, p. 55).

Classroom teachers were responsible for establishing the climate of the classroom. One of the more noticeable things about the site was the number of times that teachers talked about respect for self and respect for others. The Great Expectations program discusses the creation of a "climate of mutual respect" (Great Expectations, 1996, p. 55). "We are role models...Kids need someone that they can look up to. It's important that you give them the respect that you expect them to give to you" (Ms. Reagan, February, 1999). "Respect is the basis for the Great Expectations discipline plan" (Great Expectations, 1996, p. 55).

Teachers also discussed establishment of an environment that was risk-free and non-threatening. Uses of mistakes to teach lessons about learning were emphasized. "Mistakes are okay, for they are opportunities to learn. Allow students to catch the teacher making mistakes. Model a willingness to learn from the mistake. Help students see that mistakes are common, but we can learn something from every one" (Great Expectations, 1996, p. 19).

Positive feedback is important to the Great Expectations program. Examples of student work were in evidence in some of the classrooms. Some of the bulletin boards in the halls were used to display certificates and awards. Time was taken during the Friday assembly to recognize students for a variety of awards (Field Notes, January, 1999).

Uses of standardized procedures were in evidence throughout the building. One noticeable procedure was observed when students are in line passing to another location. Students were taught to face forward, cross their arms, and to remain silent. Students moved from place to place with a minimum of disruption. Procedures for traveling from place to place, lunchroom behavior, and other routines reflected the emphasis of the program.

Teachers talked about high standards and expectations for students. Mention was frequently made of the accelerated classes at each grade level. "I'm not working with students that can't read or working with students that are having difficulty with a certain area...I can teach essential skills pretty quick and then incorporate that into my Core Knowledge" (Ms. Johnson, February, 1999). "We talk about that since this is an accelerated class that we will have to stretch a little bit and it's going to be a little bit uncomfortable..." (Ms. Roosevelt, January, 1999).

Discussion about how to reach students and make connections with students emphasized the importance of establishing a strong relationship between teachers and students.

> I just wish I had enough chores for all of them and different privileges for them all to do. I have to rotate them but there are so many that are needing it...They are just waiting to get strokes. All of us need strokes. (Ms. Nixon, January, 1999)

"The nature of the teacher/ student relationship is the cornerstone for everything else in the classroom" (Great Expectations, 1996, p. 17).

Whole class instruction is a part of the Great Expectations philosophy. Teachers are expected to circulate throughout the room, monitoring seatwork and behavior. Frequent feedback allows the teacher the opportunity to get immediate reinforcement

about the lesson. Circulation allows teachers to be in contact with students. "Students are taught whole group, thoroughly and to mastery ..." (Great Expectations, 1996, p. 5). Whole group instruction was frequently observed at the site.

> I'll teach a reading lesson whole group and then I have some seat work that usually goes along with our Core Knowledge. Then I'll break the children up into groups. One group will come back and read out loud to me or do a word list with me or do something with me. One group will go to the centers and two groups will be at their desks. (Ms. Reagan, February, 1999)

Evidence suggests Starway Elementary School implemented only a portion of the Great Expectations philosophy at the site. There were practices advocated by the Great Expectations program that were not in evidence at the site. Absence of particular practices during the observation period means that they were not observed but is not meant to suggest that the practices did not exist at the site.

Poetry and recitation periods are often used as a character building tool in Great Expectations programs. No recitation periods were observed during the observation at the site. Students often speak in complete sentences and address adults by name in Great Expectation programs. This was not observed in all instances during observations.

Other programs are in place at the school site. Teachers mentioned the district Essential Skills program and talked about teaching the skills necessary to pass this test. The Core Knowledge program was frequently mentioned. Visible evidence of the Core Knowledge curriculum was not as apparent as the methodologies of the Great Expectations program. Core Knowledge activities were viewed by teachers as more interesting and adaptable to various presentation styles. The design of the curriculum minimized repetition and introduced new information across grade levels.

> It makes learning interesting. My kids hate it when they misbehave and I go in the next day and say, "You know, we had some problems yesterday during reading and our Core Knowledge area of Treasure Island. We got too noisy and so today we are going back to the readers. Please get your reading book out and your workbooks out." They're like, "Oh, man..." (Ms. Johnson, February, 1999)
>
> ...Core Knowledge presents itself in a way that allows the use of the computers more. It kind of opens the gate up a little bit more that if you just have a structured classroom or if you are strictly teaching essential skills. To put a PowerPoint on to give a presentation about the Civil War is easier than to put a PowerPoint on about Essential Skills. (Ms. Johnson, February, 1999)

Other district policies and procedures were also in evidence at the building level. Security procedures, from visitor sign-in sheets to badges for employees, were evident. Handbooks and printed materials welcomed parents to participate in district programs while carefully delineating program guidelines and requirements. Policies and procedures appeared designed to allow the district a great amount of control over structural issues.

The technology trainers operated with a great degree of freedom. There were no set requirements on how the trainers served the schools. Most trainers set a semi-permanent schedule but freely admitted they served some schools more frequently than others, based on need and/ or interest. Personal schedules accommodated the needs of assigned schools, paperwork requirements, district training sessions, special training sessions, and special projects. Training sessions at the district training facility were not rigidly scheduled. Trainers volunteered for specific training sessions based on availability and requests for specific training sessions. Special projects and specific special training schedules (Title III, Magnet Schools) were additional duties that trainers worked into their schedule. Trainers used one afternoon per week to meet and discuss issues.

Summary

Organizational beliefs were discussed from the framework of specific building level organizational beliefs, district level beliefs, and beliefs specific to the technology training program. Emphasis was given to building level beliefs since one school was the primary unit of analysis for this study. Most of the discussion on building level beliefs was about district programs that were in operation at the site.

Experienced and inexperienced users were analyzed for organizational beliefs but it was discovered that few differences existed between the groups. Hence, building level organizational beliefs were presented as a single unit. The groups held similar beliefs about the importance of role models and positive modeling. Teachers in the study discussed respect and were observed discussing this topic with students. Teachers were uniform in the implementation of routines throughout the building. Students were held to high standards and treated respectfully. Teachers emphasized the importance of relationships between teachers and students. Most of the instruction was teacher-centered and the routine of presentation, practice, monitoring, and testing was common. Core Knowledge activities were discussed as interesting and motivating to students. The Essential Skills program was viewed as an organizational framework, defining specific skills and knowledge per grade level.

Trainers did not mention Great Expectations or Core Knowledge activities. The Essential Skills program was mentioned in relation to activities available on the Integrated Learning Systems in schools. Trainers emphasized only district programs that were also training responsibilities.

Organizational beliefs appeared to influence the core activities of teaching, learning, and technology by supporting traditional practices. The bulk of observed practices that were supported by the Great Expectations program dealt with control issues. It appears that practices (academic and behavior modeling practices, routines, interpersonal relations, teacher-centered behaviors, and high standards) were used to minimize disruption and maximize teaching time. Teaching was driven by accountability to the district testing program and personal decisions about student knowledge. Core Knowledge activities were discussed as creating content interest to students, thereby creating additional teaching opportunities.

Trainers only discussed programs that were related to technology and training. Interestingly, trainers emphasized connections between the Integrated Learning Systems and teaching only in terms of management of information. Management features (i.e., reports of student progress) were viewed as powerful indicators of student mastery. This technical approach to teaching was in contrast to the language used by teachers to describe teaching and learning.

It appears teachers were influenced by organizational beliefs only to the extent these beliefs reinforced personal practice. Core teaching practices varied within and across groups. Teachers favored organizational practices that allowed them to teach according to personally determined standards. Teachers modified organizational practices to enhance personal practice. Trainers were influenced by organizational beliefs connected to technology. Trainers presented a technical approach to teaching based on computerized management of student information. This contrasts with the understanding of teacher role by trainers presented through personal beliefs. Trainers viewed

organizational beliefs technically and viewed personal beliefs according to personal practice.

Societal Beliefs

During the course of this study there was limited discussion about beliefs that could be classified as societal beliefs. Both groups of teachers saw societal changes as influences on the school and classroom environment. Most discussion about society talked about changes observed in students and parents over the course of a career. Changes in the actions and behaviors of students, parenting patterns, and family structure (i.e. -- single parent families, grandparents as surrogate parents, etc.) were attributed to changes in society.

> There are a lot of grandparents raising kids now...they're a little more relaxed. These kids need both parents. If we don't have one parent families, the parents are coming home so tired that a lot of these kids just get up and fix their own dinners...(Ms. Nixon, January, 1999)

Increased work responsibilities and decreased time at home were also discussed as negative contributors to change. Societal beliefs about teaching and learning were not identified during the course of this study. Trainers talked about society from the perspective of technology, indicating belief that technology was becoming part of the societal framework.

Using the Conceptual Framework

The conceptual framework used for this study suggests that societal, organizational, professional, and personal beliefs are used by teachers to interpret the technology training experience. This section will present the four areas of beliefs in relation to the conceptual framework.

Beliefs and the Conceptual Framework

The area of personal beliefs was analyzed in greater detail due to the literature's emphasis on the personal nature of teaching. Personal beliefs were analyzed to determine if these beliefs were used to develop a frame of reference that used sets of habitual expectations and the assimilation of new events through analysis of previous experiences as a type of interpretive filter.

As previously suggested, societal beliefs were not found to be influential in this study. The three groups of technology users in this study did not discuss societal beliefs to any significant degree. Observations, interviews, and document review did not reflect general societal beliefs about teaching and learning that were used as interpretive filters to describe meaning of the technology training experience. Mention of policy and procedures were limited to district and building policies. No state or federal policies were mentioned during this study. References to society did not include references to general beliefs about teaching and learning.

Organizational beliefs about teaching and learning in this building identified closely with practices associated with the Great Expectations program. Organizational beliefs appear to support traditional practices by teachers. Many of the organizational beliefs allowed teachers to maximize teaching time and minimize disruptions. Teachers favored organizational beliefs that allowed teachers to spend time teaching according to their personal style and agenda. Organizational beliefs were modified to fit the needs of personal practice. Trainers only discussed organizational beliefs tied directly to technology and these beliefs were discussed in a technical manner.

Elbaz (1981) posits that teachers use a type of knowledge that allows teachers to create an environment that is optimized for the teacher. This environment, based on practical solutions to teacher-defined problems, provides the teacher with positive feedback and maximizes the teacher's ability to teach in a personally satisfying manner. Following this model, organizational beliefs provided an environment of similar dimensions for the teacher.

Practices associated with the Great Expectations program were concentrated in Elbaz's (1981) category of content knowledge. Issues of instruction, knowledge of self as teacher, and knowledge of schooling were discussed through the Great Expectations framework. The large amount of traditional teaching practices and routines in place suggest that teachers used these practices to optimize teaching time. The content knowledge category includes curriculum and content area knowledge. Teachers attributed these dimensions to the Core Knowledge program.

Orientation knowledge proposes that teachers respond to practice from the orientation of: (1) the situation, (2) a theory or theories, (3) personal meaning making, (4) social knowledge, and (5) experience in relation to teaching style. Discussion of theory was framed within the Great Expectations model. Teachers discussed teaching as situational and intuitive. Teachers accepted responsibility for teaching and developed practices to make teaching personally meaningful. Experience and interpretation of personal teaching style influenced classroom practice.

Structural knowledge provides three rules of action believed to guide practice. Rules of practice are routine solutions to problems frequently encountered in practice. Routines were frequently observed and teachers discussed routines as positive to the

school experience. Practical principles use past experience as a guide for practice. Teachers discussed the use of practical, tested solutions. Image is the category composed of the mental images that shape the expectation of what teaching is and how it is conducted. All three of these rules of action were observed or discussed by teachers. Important to an understanding of Elbaz's model is the belief that this framework allows teachers to modify or create teaching situations that are optimized for the teacher.

The absence of direct discussion or observation of many of the principles of the Great Expectations program suggests that the model is selectively adopted based on some type of individual interpretative element. Elements adopted for use from a program may meet some individually determined set of criterion for acceptance and implementation.

The practices implemented at this site appear concentrated on the development of an environment that maximizes a teacher's opportunity to teach. Many of the practices appear to meet an image of teaching and learning that places the teacher at the center of the classroom and places students under the direct control of the teacher. Many of the practices are designed to allow a great amount of teacher control while minimizing power struggles and student disciplinary concerns.

Organizational beliefs appear to be selectively adopted to maximize teachers' personal style. Teachers, for the most part, taught in very similar manners, although style issues differed. Organizational beliefs that allowed teachers to teach in personal ways were emphasized. It is difficult to distinguish if teachers were totally responding to personal teacher images or if organizational factors influenced the observed similarities. Organizational beliefs appear to be filtered through a personal framework to determine

degree of implementation. Additionally, the beliefs observed in this study appear to be used to optimize educational settings for teachers to pursue personal practice.

The professional beliefs identified in this study primarily originated from professional development activities within the district. Groups agreed on the structure of technology training but variation between inexperienced and experienced users emerged on issues of pacing and content. Similarities existed between experienced users and trainers on beliefs about the use of technology in classrooms and schools. Both groups discussed technology as related to teaching, curriculum, and classroom activities. Inexperienced users discussed technology as supplemental to practice.

Experienced users and trainers held higher levels of technological expertise than inexperienced users. It is suggested that this expertise allowed these users to concentrate on integrating technology into personal practice and to not concentrate on learning the technology. Inexperienced users were learning technology and not confident of personal proficiency to integrate technology into practice. Furthermore, as a group, the experienced users had more teaching experience and were comfortable with personally developed practices. Confidence in personal practice may contribute to a willingness to attempt to enhance practice. Professional beliefs for all groups appear to be filtered through individual filters that influence the use of particular professional beliefs.

Personal beliefs about teaching, learning, and technology were identified for the three groups of users. Core beliefs about teaching and learning were very similar for the three groups. For the most part, instruction was teacher centered with the use of reinforcing routines for control and structure. Situational decisions influenced the flow of instruction. Although the bulk of practices were traditional in nature, inexperienced users

carried a personal image of self as a traditional teacher while experienced users were more diverse in their view of self. Differences existed between the inexperienced users and the other groups in relation to technology. Inexperienced users saw technology as supplemental to practice while trainers and experienced users saw technology as integral to practice.

Experienced users and trainers carried more technology experience and expertise than inexperienced users. Expertise appears to contribute to using technology to enhance existing practice. Experienced users also were more experienced in the classroom. Teaching experience and technological expertise may contribute to the differences found between groups more than level of training.

Structural issues, when viewed through the teacher personal knowledge area in the conceptual framework, tended to reflect issues related to optimizing the structural aspects of the training in relation to the learner. These stand in contrast to the practices previously described, which optimized the climate for the teacher. There seemed to be a consistency of belief across the three groups in regard to what constitutes effective technology training practices for teachers.

Differences appeared when groups are analyzed for purpose. Inexperienced users seemed resigned to a belief that technology is coming to the school and they need to become aware of the potential of technology. Experienced users discussed technology in relation to belief that technology could improve their personal teaching. Experienced users saw numerous ways for technology to fit into existing classroom structures or ways to create new structures to take advantage of technology's potential. Inexperienced users discussed technology as an addition to existing structures.

Experienced users talked about learning to use technology as a growth experience. Consequently, differences emerged in regard to pacing and content of the training sessions. Experienced users wanted more content and more detail. These users wanted the pace accelerated so maximum coverage was possible. Inexperienced users wanted a slower pace that reduced content. All groups agreed that the development of training by user level would be helpful.

The conceptual framework allowed analysis to illuminate that experienced and inexperienced users, rather than discussing an optimized teaching environment, were discussing an optimized learning environment based on user level and ability. The same personal beliefs appeared to be in operation but the shift in emphasis directly corresponded to the teachers' role in the training. Technology trainers continued to discuss training in relation to an optimized teaching environment. This is not to suggest that trainers were insensitive to the role of the learner but rather to suggest that structural factors were discussed to a greater degree.

Societal beliefs, organizational beliefs, professional beliefs, and personal beliefs appeared to impact the frame of reference used by teachers for interpretive purposes. For the purposes of this study, all belief systems appeared to be filtered through a personal framework. Organizational beliefs and professional beliefs appeared to be closely connected to categories originally developed by Elbaz (1981). Specifically, beliefs appeared to connect to three areas of interest: (1) optimized personal teaching environments, (2) routinized responses to common teaching dilemmas, and (3) maintenance of teacher image.

The three categories established a set of unspoken rules used by teachers to interpret experiences. These rules were used in conjunction with previous experiences to interpret events. Mezirow (1994) suggests that unspoken rules are used to develop a revised interpretation of experience. Learning becomes a process of continual revision based on unspoken rules and changing experiences.

Summary

Personal beliefs about teaching and learning may serve as an interpretive filter for analysis of the technology training experience. Important differences were noted when teachers look at beliefs about teaching and learning from a different role. When teachers are discussing the classroom, beliefs indicated the construction of teaching environments optimized for the teacher. Discussion of teacher culture indicates that teachers have a great amount of control over what happens in the classroom. Personally optimized teaching environments provided meaning for the teacher to continue practice. When teachers were placed in the role of learner, the emphasis moved from the creation of a teaching environment to the creation of a personally satisfying learning environment. Teachers desired a training environment where they got training that they believed would personally benefit them.

Findings and Research Questions

This study was guided by three research questions. Each research question is presented below with explanatory information.

(1) How do personal, professional, organizational, and societal beliefs about teaching and learning influence teachers' (experienced users of technology,

inexperienced users of technology, and technology trainers) interpretations of technology training experiences?

Data collected during this study indicates that professional, organizational, and personal beliefs about teaching and learning may influence interpretation of technology training. The complexity of the relations of the belief systems make it impossible to determine the extent to which interpretation is influenced by any one set of beliefs. Some individual framework appears to be in operation to determine interpretation but it is impossible to determine which belief set is most influential or if another unanalyzed factor is in operation. Individual frameworks appear to be used to interpret events in a manner to allow teachers to optimize the event for personal use, develop helpful routines, and to maintain a certain degree of teacher image. The relationship to the four identified sets of beliefs is unclear due to the interconnected nature of the sets and personal practice.

The groups demonstrated a high degree of agreement about positive characteristics of effective training practices. Differences between the groups were related to pacing and content of training. Experienced users desired faster paced training with a higher content load. Inexperienced users wanted less content and a slower pace of training.

(2) How do interacting beliefs about teaching and learning influence how teachers (experienced users, inexperienced users, and technology trainers) interpret technology training experiences?

Interacting beliefs were difficult to determine because of the complexity of unanticipated relations between the sets of beliefs. Conflicting, compounding, and complementary beliefs were difficult to identify due to variables not considered in the

original study. The degree to which all sets of beliefs were interpreted through personal practice made it difficult to determine how the sets related to one another. All sets of beliefs appeared to be interpreted through an individual framework in this study and modified to meet personal practice standards. It was impossible to determine the interaction between the sets of beliefs.

(3) How do described similarities and differences in the beliefs of teachers (experienced users, inexperienced users) and trainers influence technology training experiences?

All groups used an interpretive system. Complex relationships make it difficult to determine how similar and dissimilar beliefs influence training experiences. Beliefs about teaching and learning were similar across the groups. Differences are primarily attributed to personal teaching practice and teacher style. Differences in technology beliefs may be related to the unanalyzed variables. Teachers appeared to interpret training from a different viewpoint than trainers.

This indicated that teachers altered training experiences to meet personally determined goals. Teachers wanted training optimized for the learner while trainers optimized training for teaching. Teachers controlled what they learned and why they learned it. If the teacher determined that the experience was worthwhile and the training met predetermined goals, then training was viewed as successful. Personal interpretations determined the ultimate success or failure of the training. The influence of beliefs on this interpretive framework could not be established due to limitations in the original design of the study and unanticipated relations between the sets of beliefs and personal practice.

Summary: The Power of Beliefs

Beliefs were analyzed from multiple points of view to determine the influence beliefs play on the interpretation of technology training. Organizational beliefs were found to be selectively implemented based on personal practice. It was impossible to determine whether organizational beliefs determined practice or practice only selected organizational beliefs that confirmed existing practice. Professional beliefs appeared related to technology expertise and teaching experience. It is suggested that expertise and other variables allowed advanced users to think about technology and personal practice in ways beginning users do not. Comfort level with personal practice may be significant and related to teaching experience and other variables. Professional beliefs for all groups appear to be filtered through individual filters that influence the use of particular professional beliefs, but relationships between the sets of beliefs and personal practice make it impossible to determine the composition of these individual beliefs.

Variation in the stated personal beliefs existed within and across groups. The amount of technology experience, technology training level, and teaching experience may influence how the technology training experience is interpreted. These unanalyzed variables make it difficult to determine the extent of influence of personal beliefs.

This chapter attempted to filter the large amount of information obtained on beliefs and to funnel this information into a more manageable set of information. Analysis concluded that personal frameworks do influence the interpretation of personal practice. The most significant area of teacher personal beliefs was directed toward the optimization of a teaching environment for the teacher. Secondary influences of

significance dealt with routines to handle problems frequently encountered in practice and maintenance of teacher image.

It would appear from the data that organizational and professional beliefs are interpreted through some type of individual framework. It would also appear that organizational and professional beliefs that agree with established personal beliefs are influential in the implementation process. Organizational and professional beliefs appear to influence interpretation but unanalyzed variables and unanticipated relations make the degree of this influence difficult to establish.

It would appear teachers attempt to create environments personally optimized for a personal teaching style. Reinforcement and motive are connected to this environment in powerful ways. Teachers teach in certain ways because they are able to create environments that provide reinforcement. The individualized nature of teaching and personality differences, combined with a personally optimized environment accounts for tremendous variation in classroom practice.

The variation in personal beliefs cuts across the three user groups. Interpretations of the technology training experience do not appear to be influenced by this variation since the three groups recommend similar training approaches and follow-up strategies. Variation is noted in pace and the content of training issues. Teacher role, level of technology expertise, teaching experience, and training level may influence the interpretation of training independently of organizational, professional, or personal beliefs.

Chapter VI will provide conclusions developed from the data and implications for the research. Suggestions for future research will be advanced.

CHAPTER VI

CONCLUSIONS, IMPLICATIONS, RECOMMENDATIONS

This study was designed to examine the influence of personal, professional, organizational, and societal beliefs about teaching and learning on the technology training experience. Specifically, this study proposed that beliefs held by teachers influence teacher interpretation of the technology training experience. Chapter I presented background information and an introduction to the subject. Chapter II functioned as a review of the pertinent literature concerning the influence of beliefs on the technology training experience. The third chapter presented the methodology that guided this study. Chapter IV presented the case. Data collected during field work by observation, interview and document review were presented. All field work was conducted by the researcher and was guided by the following three research questions:

1. How do personal, professional, organizational, and societal beliefs about teaching and learning influence teachers' (experienced users of technology, inexperienced users of technology, and technology trainers) interpretations of technology training experiences?
2. How do interacting beliefs about teaching and learning influence how teachers (experienced users, inexperienced users, and technology trainers) interpret technology training experience.

3. How do described similarities and differences in the beliefs of teachers (experienced users, inexperienced users) and trainers influence technology training experiences?

The fifth chapter analyzed the data obtained from the three groups of technology users. Based on the data presented from this site and on the outcomes of analysis, several findings emerged.

1. Personal interpretive filters are used to interpret technology training.
2. The influence of individual beliefs and interacting beliefs on personal interpretive filters cannot be established.
3. Personal frameworks serve to interpret events in a manner to allow teachers to optimize the event for personal use, develop helpful routines, and to maintain a degree of teacher image.
4. Teaching experience, level of technological expertise, level of training, and other unanalyzed factors may account for differences in content and pacing considerations for technology training and stated beliefs about technology.
5. Organizational and professional beliefs appear to be primarily interpreted through personal frameworks.

The following chapter presents the conclusions developed from the data, the implications for technology training projects for teachers, and recommendations for future research.

Conclusions

Conclusions to be discussed are: (1) the power of beliefs about teaching and learning as influences on interpretations of technology training, (2) the use of personal

frameworks to develop an optimized teaching situation, (3) the significance of routines in optimized teaching environments, (4) the power of teacher image, (5) positive and negative practices in technology training, and (6) differences in content and pacing requirements for teachers.

Personal frameworks about teaching and learning serve to interpret educational events. Variations within and across groups and the influence of overlapping belief sets made it impossible to assign interpretive power to belief sets individually or collectively. Unanalyzed variables (level of technology expertise, level of technology training, and teaching experience) may account for recorded differences between groups and individuals.

Beliefs appeared connected to personal practice. Organizational beliefs specific to personal practice were discussed. Evidence suggests teachers selected organizational beliefs that confirmed existing practice. Organizational beliefs and practices that provided structural assistance, maximized teaching time, and reinforced teacher role were selectively applied to personal practice. The link between organizational beliefs and development of personal practice was unexplored.

Professional beliefs were analyzed through technology training. Variation existed within and across groups concerning how technology was used in classrooms and beliefs about future use of technology for personal practice. Beliefs about future technological use and existing use of technology appeared related to existing personal practice. Practices that reinforced existing practice were favored.

Personal beliefs also demonstrated variation within and across groups. The degree of influence personal beliefs exerted on interpretation of events was difficult to determine

due to the complex relations of the sets of beliefs. Stated personal beliefs were reflected in existing personal practice. Teachers appeared to select organizational, professional, and personal beliefs based on an individual framework for interpretation.

The degree of influence between beliefs and interpretation was inconclusive. It appears that beliefs and other variables influenced interpretation of the structure of the training process minimally. Common agreement existed on how technology training should be conducted to effectively teach technology skills and concepts to teachers. "How" training was conducted was less related to beliefs and other variables about teaching and learning than "why" training was important for personal practice. Differences were noted primarily about pacing and content issues.

Experienced users and trainers appeared to understand ways that technology could mesh with current personal practice. Inexperienced users were still exploring this issue. Experienced users appeared confident about personal practice and willing to experiment with technology to enhance such practice. Inexperienced users were less confident of personal technological expertise, resulting in less exploration of connections between personal practice and technology. It is believed that other variables may contribute to these differences.

It is suggested that once a certain level of expertise is reached, technology may be viewed as another presentation tool to enhance personal practice. Until that level is reached, technology is delegated to a secondary place in classrooms. Links between beliefs, level of technology training, level of technology expertise, and teaching experience were unanalyzed in relation to this issue.

Personal frameworks served to allow teachers to create teaching environments optimized for teachers and teaching. Teachers taught in personal and individual ways. Variations in style and personal teaching outcomes were noted although presentation, organizational, and management systems were similar. A type of personal framework appeared to be in operation to provide organization for development of personal teaching styles and personalized teaching environments. Data were inconclusive in establishing the way beliefs influence this framework.

Teachers taught in specific manners because of multiple factors. Variation in individual style allowed teachers to interpret organizational and professional goals through personal teaching practice. Teachers favored interpretations that allowed teachers to teach in the individual manner believed most effective for personal teaching practice. Reinforcement for such practice came from interaction with students and successful teaching episodes. Optimized teaching environments may enhance the types of relationships and outcomes that teachers favor. Such environments and structure allow teachers to teach according to their image of personal practice related to other goals of the organization. Optimized teaching may allow teachers to derive personal meaning from the experience.

Highly structured routines were useful in controlling the teaching environment. Routines created a type of structure that minimized control issues and maximized the opportunity for teachers to teach in a personally selected manner. Routines provided a structural boundary, defined by the teacher, that determined the organization of the classroom. Routines appeared to provide a sense of structure for students and teachers to

maximize time and minimize confusion. Routines were used to allow teachers to pursue personal practice.

Teacher image appeared important to practicing classroom teachers. Teachers were viewed as responding to situations in certain ways. Personal images of what a teacher is supposed to do in classrooms may drive much of the observed practices. This image appeared highly tempered by the manner in which the image meshed with personal practice. The consistent manner in which teachers appeared at the center of instruction and the directiveness of instruction suggests a common image of instruction. Variation in style suggests modification to meet individually determined standards.

Respondents in this study suggested that technology training must emphasize hands-on exploration of the computer and related technologies. Teachers wanted to practice in an environment where experts stood available for assistance. Training sessions that developed trust between the trainer and the users and encouraged risk-taking were requested. Multiple presentation approaches were favored to allow learners to assimilate information through several modalities. Adequate time for practice and reflection on learning were issues. Follow-up activities and adequate practice time on site were also suggested. Teachers wanted training related to teaching practices.

Lack of time and resources were the greatest identified barriers to learning. Time for training, practice, and reflection was needed to successfully train teachers to use technology in the classroom. Teachers and trainers suggested identifying technological skill levels and grouping teachers by level to improve training. Teachers were adamant that resources should be available for use. Training on systems and resources that did not exist in schools was believed to be counterproductive.

Differences between experienced and inexperienced users were centered on pacing issues and content issues. The current training model was viewed as too rapid and too content heavy for beginning users while offering too little content and challenge for experienced users. Both groups agreed on how training should be conducted, but differences in pacing and content were noted. Differentiated training for identified user levels offered a solution.

Personal frameworks about teaching and learning influenced how teachers interpreted technology training. Additionally, personal interpretation of organizational and professional beliefs influenced how these beliefs interpreted training. There was general agreement on structural and technical issues of training. Differences were noted when identified groups discussed expectation and rationale issues. Differences were noted in regard to pacing and content issues as well. Complex relationships inhibit interpretation of the significance of beliefs to interpretations of technology training.

Implications

Implications for theory, research, and practice will be presented. Implications for theory suggest the conceptual framework used for this study was not useful to isolate personal, professional, organizational, and societal beliefs in teachers. The interconnected nature of beliefs and other unanalyzed factors impeded identification and isolation of beliefs. The framework did illuminate the importance of personal frameworks as interpretive filters. Further research in the area is needed to establish a baseline.

Additional research on teacher beliefs and technology training should focus on mechanisms to isolate beliefs into categories for analysis. The impact of personal practice should be considered in future research into technology training. Beliefs may be highly

connected to personal practice, although the mechanism used in this study was unable to determine degree of involvement. The interconnected natures of beliefs and personal practice need exploration with other frameworks. The development of other frameworks for analysis may yield data about beliefs, personal practice, and technology training.

Implications for practice are numerous. Technology training models should be explored that effectively allow teachers to explore use of technology in the classroom. Use of technology may be related to personal practice and unanalyzed variables identified in this study. A better understanding of the influence of these variables may be useful to develop effective training models. The limited effectiveness of current models must be considered for future training. To develop alternative models, a better understanding of how teachers view current training is useful and this understanding should be considered in relation to factors influencing personal practice.

The complicated nature of schools influences the technology training process. Teachers are unwilling to integrate unproven practices into the classroom. For teachers, tests of practicality and proof of effectiveness are paramount. Teachers will use what works to meet personally constructed goals and outcomes. The interpretation of personal practice in relation to competing outside influences is critical to understanding technology training. Teachers want proof that investment in time and effort will result in changes in the classroom. Teachers want proof that technology will not alter carefully designed personal practices.

Models are favored that provide teachers with adequate time and resources to explore the impact of technology on personal practice. The power of training effectiveness that emerged from this study deals with the development of understanding

of the use of technology in relation to personal practice. As expertise in the use of technology increases, teachers begin to see numerous ways that technology can be used to support personal practice. This creates a circle of learning in which practice drives training while training also drives practice.

The interactions of variables identified through this study should be investigated to better understand ways that multiple factors influence interpretation of training. Models should be developed that are sensitive to the reality of the classroom environment, personal practice, level of technological expertise, teaching experience, and other factors that may influence interpretation of training. Teachers must be convinced that technology improves learning and enhances personal practice.

Recommendations for Further Research

Based on the findings and conclusions developed by this study, six recommendations for further research on the influence of personal, professional, organizational, and societal beliefs on the technology training experience are advanced. These recommendations are as follows:

1. Studies should be considered that allow the interconnected nature of beliefs to be categorized. The relationship between beliefs and technology training will benefit from frameworks that account for unanalyzed variables identified in this study.
2. Research should be designed to explore the use of personal frameworks for interpretation of educational events. Personal practices appear to be related to interpretation and implementation decisions. Identification of the interpretive frameworks used to identify meaningful practices should be considered.

3. More research needs to be conducted that analyzes the needs of different levels of technological expertise. The generic training models in use fails to meet the needs of certain groups of users. Identification of these user groups and targeted training may provide additional information on the implementation process.
4. Studies should be conducted that explore the relationship between beliefs and professional development practices. Greater understanding of how beliefs influence the learning process may assist the design of future training practices.
5. More research on the influence of beliefs on practice would be a welcome addition to the field. Beliefs that influence practice are difficult to understand in relation to the complex world of the classroom and personal factors unique to individual teachers. Detailed analysis that describes the complexity of schools in relation to personal practice and beliefs may serve to inform preservice practice.
6. Research should be conducted that analyzes the implementation of technology in respect to beliefs. Teachers often get the blame for the failure of technology to modify schools. The complex nature of the implementation process needs revisited in relation to technology and personal, professional, organizational, and societal beliefs.

Summary

This chapter presented the conclusions, implications, and recommendations developed from the study of the how beliefs about teaching and learning influence the technology training process. Analysis of the data lead to a better understanding of the influence of multiple variables on interpretation of technology training. Six major conclusions were advanced in this chapter. Implications drawn from these conclusions add to the body of knowledge on beliefs and technology training.

REFERENCES

Abdal-Haqq, I. (1995). Making time for teacher professional development. Washington, DC: ERIC Clearinghouse on Teaching and Teacher Education. (ERIC Digest No. 95-4).

Akbada, S. & Kurubacak, G. (1998). Teachers' attitudes towards technology. Available: http://www.coe.uh.edu/insite/elec_pub/HTML1998/re_akba. [1999, February 19].

Anstendig, L. & Meyer, J. (1997). Researching the internet in a writing class: A writing teacher's role and a computer specialist's role. A paper presented at the Annual Conference on College Composition and Communication, Phoenix, AZ. March 1997.

Aquila, F. & Parish, R. (1989, Winter). The clash of cultures: Instructional technology and the craft of teaching. Journal of Research and Development in Education 22(2), 49-55.

Bacharach, S., Bauer, S. & Shedd, J. (1986). The learning workplace: The conditions and resources of teaching. Ithaca, NY: Organizational Analysis and Practice.

Barnes, D. (1992). The significance of teachers' frames for teaching. In T. Russell & D. Munby (Eds), Teachers and teaching from classroom to reflection, (pp. 9-32). London, GB: The Falmer Press.

Barron, A. & Ivers, K. (1997). Web pages and K-12 education: Patterns of usage. In the National Educational Computing Conference Proceedings. Seattle, WA. 48-54. June 1997.

Bates, R. (1986). Critical practice of educational administration. In T. Sergiovanni and J. Corbally (Eds.) Leadership and organizational culture: New perspectives on administrative theory and practice, (pp. 260-274). Urbana, IL: University of Illinois Press.

Becker, H. (1993). Instructional computer use: Findings from a national survey of school and teacher practices. The Computing Teacher, 20(1), 6-7.

Becker, H. (1994, Spring). How exemplary computer-using teachers differ from other teachers: Implications for realizing the potential of computers in schools. Journal of Research on Computing in Education, 26(3), 291-321.

Bennis, W. (1986). Transformative power and leadership. In T. Sergiovanni and J. Corbally (Eds.) Leadership and organizational culture: New perspectives on administrative theory and practice, (pp. 64-71). Urbana, IL: University of Illinois Press.

Berg, B. (1989). Qualitative research methods for the social sciences. Boston, MA: Allyn and Bacon.

Berg, S., Benz, C., Lasley, T. & Raisch, D. (1997, October). The coordinators and the teachers: A description of exemplary use of technology in elementary classrooms. A paper presented at the Annual Meeting of the Mid- western Educational Research Association, Chicago, IL.

Berry, S. (1994). Teachers' opinions of computer-assisted instruction (CAI). (ERIC Document Reproduction Service No. 382 563).

Beyer, F. & Dusewicz, R. (1991, April). Impact of computer-managed instruction on small rural schools. A paper presented at the Annual Meeting of the Annual Educational Research Association, Chicago, IL.

Bishop, J. (1990). A system wherein students become active learners. In S. Bacharach (Ed.), Educational reform: Making sense of it all, (pp. 234-258). Boston, MA: Allyn and Bacon.

Bolster, A. (1983). Toward a more effective model of research on teaching. Harvard Educational Review, 53, 294-308.

Britzman, D. (1986). Cultural myths in the making of a teacher: Biography and social structure in teacher education. Harvard Educational Review, 56(4), 442-456.

Brookfield, S. (1986). Understanding and facilitating adult learning. San Francisco, CA: Jossey-Bass.

Brousseau, B., Book, C. & Byers, J. (1988). Teacher beliefs and the cultures of teaching. Journal of Teacher Education, 39(6), 33-39.

Brown, J., Collins, A., & Duguid, P. (1989, Jan./ Feb.). Situated learning and the culture of learning. Educational Researcher, 18(1), 32-42.

Bruner, J., (1996). The culture of education. Cambridge, MA: Harvard University Press.

Burgstahler, S. Baker, L. & cronheim, D. (1997). Peer-to-peer relationships on the internet: Advancing the academic goals of students with disabilities. In the National Educational Computing Conference Proceedings. Seattle, WA. 84-90. June 1997.

Bussis, A., Chittenden, F. & Amarel, M. (1976). Beyond surface curriculum: An interview study of teachers' understandings. Boulder, CO: Westview Press.

Butzin, S. (1991). Project CHILD (Computers Helping Instruction and Learning Development): Integrating computers into the elementary school. A summative evaluation. Tallahassee, FL: Center for Instructional Development and Services. (ERIC Document Reproduction Service No. ED 338 221).

Carey, D. & Sale, P. (1997). Laptop computers use by students with severe disabilities. In the National Educational Computing Conference Proceedings. Seattle, WA. 94-102. June 1997.

Casey, J. (1997). Teacher net: Building a new cadre of technology using teachers online. In the National Educational Computing Conference Proceedings. Seattle, WA. 102-107. June 1997.

Chan, C. Burtis, B. & Bueiter, C. (1997). Knowledge building as a mediator of conflict in conceptual change. Cognition and Instruction, 15(1), 1-40.

Clark, C. (1988). Asking the right questions about teacher preparation: Contributions of research on teaching thinking. Educational Researcher 17(2), 5-12.

Clark, R. (1983). Reconsidering research on learning from media. Review of Educational Research, 53(4), 445-459.

Clark, R. (1985). Evidence for confounding in computer-based instruction studies: Analyzing the meta-analyses. Educational Communications and Technolgy Journal, 33(4), 249-262.

Clark, D., Smith, R., Newby, T., & Cook, V. (1985). Perceived origins of teaching behavior. Journal of Teacher Education, 36(6), 49-53.

Clark, C. & Peterson, P. (1986). Teachers' thought processes. In M. Wittrock (Ed.), Handbook of research on teaching (3rd ed., pp. 255-296). New York: MacMillan Publishing.

Cole, M. & Wertsch, J. (1996). Beyond the individual-social antimony in discussions of Piaget and Vygotsky. Human Development 39(5), 250-256.

Combs, A. (1982). A personal approach to teaching: Beliefs that make a difference. Boston, MA: Allyn & Bacon.

Conners, R. (1978). An analysis of teacher thought processes, beliefs, and principles during instruction. Unpublished doctoral dissertation, University of Alberta, Canada.

Corporaal, A. (1991). Repertory grid research into cognitions of prospective primary school teachers. Teaching and Teacher Education, 7(4), 315-329.

Cross, P. (1981). Adults as learners: Increasing participation and facilitating learning. San Francisco, CA: Jossey-Bass Inc., Publishers.

Cuban. L. (1986). Teachers and machines: The classroom use of technology since 1920. New York: Teachers College Press.

Cusick, P. (1992). The educational system: Its nature and logic. New York: McGraw- Hill, Inc.

Deal, T. & Kennedy, A. (1982). Corporate cultures: The rites and rituals of corporate life. Reading, MA: Addison- Wesley.

Dewey, J. (1938). Experience and education. New York: Collier.

Dobson, R., Dobson, J. & Koetting, J. (1985). Looking at, talking about and living with children. Lanham, MD: University Press of America.

Dupagne, M. & Krendl, K. (1992). Teachers' attitudes towards computers: A review of the literature. Journal of Research on Computing in Education, 24(3), 420-429.

Dwyer, D. (1994, April). Apple Classrooms of Tomorrow: What we've learned. Educational Leadership, 51(7), 4-10.

Eisenhart, M., Shrum, J., Harding, J., & Cuthbert, A. (1988). Teacher beliefs: Definitions, findings and directions. Educational Policy, 2, 51-70.

Elbaz, F. (1981). The teacher's "practical knowledge": Report of a case study. Curriculum Inquiry 11(1), 43-71.

Ely, D. (1997, December). The field of educational technology: Update 1997. Syracuse, NY: ERIC Clearinghouse on Information and Technology. (ERIC Document Reproduction Service No. ED 413 889).

Erickson, F. (1987). Conceptions of school culture. Educational Administration Quarterly, 23(4), 11-29.

Evertson, C. & Weade, K. (1989). Classroom management and teaching style: Instructional stability and variability in two junior high classrooms. Elementary School Journal, 89, 379-393.

Freire, P. (1994). Pedagogy of hope: Reliving pedagogy of the oppressed. New York: Continuum Publishing.

Fryatt, A. & Gregg, D. (1997). Designing virtual practicums for preservice teachers: Three project iterations. In the National Educational Computing Conference Proceedings. Seattle, WA. 177-183. June 1997.

Fullan, M. (1982). Research into educational innovation, in H. Gray (Ed.) Management of Educational Institutions. New York: McGraw-Hill, 245-261.

Fullan, M. & Pomfret, A. (1977). Research in curriculum and instructional implementation. Review of Educational Research 47(2), 335-397.

Fuller, F. (1969). Concerns of teachers: A developmental characterization. American Educational Research Journal, 6, 207-226.

Gardner, H. (1991). The unschooled mind: How children think and how schools should teach. United States: Basic Books.

Gay, L. (1996). Educational research: Competencies for analysis and application. (5th ed.). Englewood Cliffs, NJ: Prentice-Hall.

Glenna, T. & Melmed, A. (1996). Fostering the use of educational technology: Elements of a national strategy. A Rand report. Santa Monica, CA: Rand Corporation.

Goodlad, J. (1984). A place called school: Prospects for the future. New York: McGraw- Hill.

Gould, R. (1972). The phases of adult life: A study in developmental psychology. American Journal of Psychiatry, 129, 521-531.

Great Expectations Foundation (1996). Great expectations handbook: 1996. Tahlequah, OK: Author.

Green, M. (1991). In A. Lieberman & L. Miller (Eds.), Staff development for education in the '90s: New demands, new realities, new perspectives. (2nd ed., pp. 3-14). New York: Teachers College Press.

Griffin, G. (1985). The school as a workplace and the master teacher concept. The Elementary School Journal 86(1), 1-16.

Gunn, C. (1997). Teacher change: Making innovations explicit. In the National Educational Computing Conference Proceedings. Seattle, WA. 191-196. June 1997.

Gunter, R. & Gunter, G. (1994). The effect of class size on students' attitudes toward computers. (ERIC Document Reproduction Service No. 382 187).

Guskey, T. (1986). Staff development and the process of teacher change. Educational Researcher, 15(5), 5-12.

Guthrie, L. & Rosenzweig, L. (1997, June). Integrating technology into primary grade level language arts programs: Research on Apple's early language connections. In the National Educational Computing Conference Proceedings. Seattle, WA. 199-206.

Hadley, M. & Sheingold, K. (1993). Commonalities and distinctive patterns in teachers'integration of computers. American Journal of Education, 101, 261-315.

Hannafin, R. & Freeman, D. (1995, January/ February). An exploratory study of teachers' views of knowledge acquisition. Educational Technology. 49-56.

Harvey, J. & Purnell, S. (1995, March). Technology and teacher professional development. A Rand report. Santa Monica, CA: Rand Corporation.

Hayslip, B. & Panek, P. (1993). Adult development and aging. Second edition. New York: HarperCollins College Publishers.

Hersey, P. & Blanchard, K. (1988). Management of organizational behavior: Utilizing human resources. Fifth edition. Englewood Cliffs, NJ: Prentice Hall.

Hollingsworth, S. (1989, Summer). Prior beliefs and cognitive changes in learning to teach. American Educational Research Journal, 26(2), 160-189.

Holt-Reynolds, D. (1992). Personal history-based beliefs as relevant prior knowledge in coursework: Can we practice what we teach? American Educational Research Journal, 29, 325- 349.

Honey, M. & Moeller, B. (1990). Teachers' beliefs and technology integration: Different values, different understandings. Technical Report No. 6. New York: Center for Technology in Education.

Horowitz, R. (1994). Adolescent beliefs about oral and written language. In R. Garner & P. Alexander (Eds), Beliefs about text and instruction with text, (pp. 1 - 21). Hillsdale, NJ: Lawrence Erlbaum Associates.

Hurst, D. (1994, April). Teaching technology to teachers. Educational Leadership, 51(7), 74-76.

Husen, T. & Postlethwaite, T. (Eds.). (1994). The international encyclopedia of education. (2nd ed.). Kidlington, GB: Elsevier Science Ltd.

Ignatovich, F., Cusick, P. & Ray, J. (1979). Value/belief patterns of teachers and those administrators engaged in attempts to influence teaching. Research Series No. 43. East Lansing, MI: Institute for Research on Teaching. (ERIC Document Reproduction Service No. 181 007).

Interactive Educational Systems Design, Inc. (1995). Report on the effectiveness of technology in schools, 1990-1994. Washington, DC: Software Publishers Association.

Jackson, P. (1968). Life in classrooms. New York: Holt, Rinehart and Winston.

Janesick, V. (1979). An ethnographic study of a teacher's classroom perspective: Implications for curriculum. East Lansing, MI: Institute for Research on Teaching. (ERIC Document Reproduction Service No. 173 302).

Jarvis, P. (1992). Paradoxes of learning. San Francisco, CA: Jossey-Bass Publishers.

Johnson, K. (1992). The relationship between teachers' beliefs and practices during literacy instruction for non-native speakers of English. Journal of Reading Behavior, 24(1), 83-108.

Johnson, M. & Vaughn, S. (1992). Empowering teachers through technology: Developing the rural school of the 21st century. A paper presented at the Annual Meeting of the American Educational Research Association. San Francisco, CA. April 1997.

Kagan, D. (1992). Implications of research on teacher beliefs. Educational Psychologist, 27(1), 65-90.

Kerr, S. (1991, Fall). Lever and fulcrum: Educational technology in teachers' thought and practice. Teachers College Record, 93(1), 114-136.

Khalili, A. & Shashaani, L. (1994). The effectiveness of computer applications: A meta-analysis. Journal of Research on Computing in Education, 27(1), 48-61.

Kidder, T. (1989). Among schoolchildren. Boston: Houghton Mifflin.

Knowles, M. (1984). Andragogy in action. San Francisco, CA: Jossey-Bass.

Knowles, J. & Holt-Reynolds, D. (1991). Shaping pedagogies through personal histories in preservice teacher education. Teachers College Record 93(1), 87-113.

Kohlberg, L. (1984). The psychology of moral development. San Francisco, CA: Harper & Row.

Kottler, J. (1997). What's really said in the teacher's lounge: Provocative ideas about cultures and classrooms. Thousand Oaks, CA: Corwin Press, Inc.

Kulik, C. & Kulik, J. (1991). Effectiveness of computer-based instruction: An updated analysis. Computers in Human Behavior, 7, 75-94.

Kulik, J. & Kulik, C. (1987). Computer-based instruction: What 200 evaluations say. In M. Simonson & S. Zvacek (Eds.). Proceedings of selected research presentations (pp. 17-24). Atlanta, GA: Association for Educational Communications and Technology.

Lambert, M. (1984). Teaching about thinking and thinking about teaching. Journal of Curriculum Studies, 16, 1-18.

Leithwood, K. (1990). The principals role in teacher development. In B. Joyce (Ed.), Changing school culture through professional development. Alexandria, VA: Association for Supervision and Curriculum Development.

Lenz, E. (1982). The art of teaching adults. New York: Holt, Rinehart and Winston.

Levine, S. (1989). Promoting adult growth in schools: The promise of professional development. Boston, MA: Allyn & Bacon.

Levinson, D. (1986). A conception of adult development. American Psychologist, 41, 3-13.

Lieberman, A. & Miller, L. (1992). Teachers - their world and their work: Implications for school improvement. New York: Teachers College Press.

Lincoln, Y. & Guba, E. (1985). Naturalistic Inquiry. Newbury Park, CA: Sage.

Loevinger, J. (1976). Ego development: Conceptions and theories. San Francisco, CA: Jossey-Bass

Logan, R. (1995). The fifth language: Learning a living in the computer age. Totonto, Canada: Stoddart Publishing Co. Limited.

Lortie, D. (1975). Schoolteacher. Chicago: University of Illinois Press.

McCracken, G. (1988). The long interview. Newbury Park, CA: Sage Publications.

McLaughlin, M. & Marsh, R. (1978). Staff development and school change. Teachers College Record, 80(1), 69-94.

MacKenzie, D. (1983). Research for school improvement: An appraisal of some recent trends. Educational Researcher 12(4), 5-17.

Main, R. & Roberts, L. (1990, December). Educational technology in the California public schools: A statewide survey. Educational Technology, 30(12), 7-19.

Marland, P. (1977). A study of teachers' interactive thoughts. Unpublished doctoral dissertation, University of Alberta, Canada.

Marshall, C. & Rossman, G. (1989). Designing qualitative research. Newbury Park, CA: Sage Publications.

Mehlinger, H. (1996, February). School reform in the information age. Phi Delta Kappan, 77(6), 400-407.

Mercer, N. (1992). Culture, context and the construction of knowledge in the classroom. In P. Light & G. Butterworth (Eds.) Context and cognition: Ways of learning and knowing, (pp.28-46). Hillsdale, NJ: Lawrence Erlbaum Associates.

Mergendoller, J., Stoddart, T,. & Horan, C. (1993). Using a portfolio strategy to evaluate utah's educational technology initiative: Findings and policy lessons. A paper presented at the Annual Meeting of the American Educational Research Association, Atlanta, GA. April 1997.

Merriam, S. (1988). Case study research in education: A qualitative approach. San Francisco, CA: Jossey-Bass Publishers.

Mezirow, J. (1994, Summer). Understanding transformation theory. Adult Education Quarterly 44(4), 222-244.

Mezirow, J. (1996, Spring). Contemporary paradigms of learning. Adult Education Quarterly 46(3), 158-173.

Mezirow, J. (1997). Transformative learning: Theory to practice. In P. Cranton (Ed), Transformative learning in action: Insights from practice. New Directions for Adult and Continuing Education, No. 74. San Francisco, CA: Jossey-Bass.

Mezirow, J. & Associates, (1990). Fostering critical reflection in adulthood: A guide to transformative and emancipatory learning. San Francisco, CA: Jossey-Bass.

Michelson, E. (Summer, 1996). Beyond Galileo's telescope: Situated knowledge and the assessment of experiential learning. Adult Education Quarterly, 46(4), 185-196.

Milner, S. (1990). Teaching teachers about computers: A necessity for education. Phi Delta Kappan, 61(8), 544-546.

Moore, J. (1988, October). Principles of andragogy in collegiate faculty development. (ERIC Document Reproduction Service No. ED 301 095).

Munby, H. (1982). The place of teachers' beliefs in research on teacher thinking and decision making, and an alternative methodology. Instructional Science, 11, 201-225.

National Education Goals Panel (1995, July). Teacher education and professional development. Washington, DC: Report of the GOAL 4 resource group.

Niederhauser, D. & Stoddart, T., (1994). Teachers' perspectives in computer-assisted instruction: Transmission versus construction of knowledge. A paper presented at the Annual Meeting of the American Educational Research Association. New Orleans, LA. February, 1994.

Neil, R. (1985). Inservice teacher education: Five common causes of failure. Action in teacher education, 7(3), 49-55.

Niess, M. & Merickel, M. (1997). Integrating computer technology in teaching and learning: A systemic problem. In the National Educational Computing Conference Proceedings. Seattle, WA. 335-340. June 1997.

Oberg, A. (1986). Using construct theory as a basis for research into teacher professional development. Journal of Curriculum Studies 19(1), 55-65.

O'Donnell, E. (1996). Integrating computers into the classroom: The missing key. Lanham, MD: Scarecrow Press, Inc.

Office of Accountability. (1997). Profiles 1997: District report. [report]. [Oakway] City, OK: Author.

Office of Educational Research. (1995). Educational systems intergrators/ integrated learning systems project: Titan schools 1993-94. Brooklyn, NY: Office of Educational Research.

Office of Educational Technology. (1995, March). Making it happen. Report of the secretary's conference on educational technology. Washington, DC: U.S. Government Printing Office.

Office of Science and Technology Policy. (April, 1997). Science and technology shaping the twenty-first century. Washington, DC: U.S. Government Printing Office.

Oja, S. (1991). Adult development: Insights on staff development. In A. Lieberman & L. Miller (Eds.) Staff development for education in the '90s:New demands, new realities, new perspectives. (pp. 37-60). New York: Teachers College Press.

[Oakway] City Public Schools. (1996, November). Core knowledge and great expectation programs: Evaluation report. [report]. [Oakway] City, OK: Professional Development and Instructional Leadership.

[Oakway] City Public Schools. (1998a). Summary information of TLCF subgrants. [report]. [Oakway] City, OK: Author.

[Oakway] City Public Schools. (1998b). Technology training schedule: January – February, 1999. [brochure]. [Oakway] City, OK: Author.

[Oakway] City Public Schools. (1998c). 1997-98 statistical profile. [report]. [Oakway] City, OK: Planning, Research, and Evaluation.

[Oakway] Networks for Excellence. (1996, September). [Oakway] networks for excellence in education. [brochure]. Norman, OK: University of Oklahoma.

Oliver, B., Malm, L., Malone, B., Nay, F., Saunders, N., & Thompson, J. (1997). Enhancing elementary curricula through internet technology. A paper presented at the Annual Meeting of the Mid- western Educational Research Association, Chicago, IL. October 1997.

Omoregie, M. & Coleman, B. (1997). Technology infusion: The impact of technology infusion in creating quality instructional materials. A paper presented at the Annual Meeting of the National Conference on Creating the Quality School, Oklahoma City, OK. March 1997.

Orlich, D. (1989). Staff development: Enhancing human potential. Boston, MA: Allyn and Bacon.

Ost, D. (1989, Winter). The culture of teaching: Stability and change. The Educational Forum 53(2), 163-181.

Pan, A. & Zbkewski, J. (1997). Teachers perceptions about computer-enhanced writing: A reality check. In the National Educational Computing Conference Proceedings. Seattle, WA. 349-355. June 1997.

Pappillion, M., & Cellitti, A. (1996). Developmental technology inservice training. Available:http://www.coe.uh.edu/insite/elec_pub/html1996/00toc. [1999, February 28].

Patterson, J., Purkey, S. & Parker, J. (1986). Productive school systems for a nonrational world. Alexandra, VA: Association for Supervision and curriculum development.

Patton, M. (1980). Qualitative evaluation methods. Beverly Hills, CA: Sage Publications, Inc.

Peck, K. & Dorricot, D. (1994). Why we use technology? Educational Leadership, 51(7), 11-14.

Peters, T. and Waterman, R. , (1982). In search of excellence: Lessons from America's best-run companies. New York: Warner Books, Inc.

Peterson, P. & Clark, C. (1978). Teachers' reports of their cognitive processes during teaching. American Educational Research Journal, 15, 555- 565.

Peterson, P., Marx, R. & Clark, C. (1978). Teacher planning, teacher behavior, and student achievement. American Educational Research Journal, 15, 417-432.

Powell, R. (1992). The influence of prior experiences on pedagogical constructs of traditional and nontraditional preservice teachers. Teaching and Teacher Education, 8(3), 225-238.

Purkey, S. and Smith, M. (1983, January). Effective schools: A review. The Elementary School Journal 83(4), 427-452.

Purkey, S. and Smith, M. (1985, January). School reform: The district policy implications of the effective schools literature. The Elementary School Journal 85(3), 353-389.

Richardson, V., Anders, P., Tidwell, D., & Lloyd, C. (1991). The relationship between teachers' beliefs and practices in reading comprehension instruction. American Educational Research Journal, 28(3), 559-586.

Riel, M. (1994, Summer). Educational change in a technologically-rich environment. Journal of Research on Computing in Education, 26(4), 452-474.

Rogoff, B., Malkin, C. and Gilbride, K. (1984, March). Interaction with babies as guidance in development. In B. Rogoff & J. Wertsch (Eds.) Children's learning in the "zone of proximal development". New directions for child development, No. 23. San Francisco, CA: Jossey-Bass Inc.

Romanowski, M. (1997). Teachers' lives and beliefs: Influences that shape the U.S. history curriculum. A paper presented at the American Educational Research Association Annual Meeting, Chicago, IL, April 1997. (ERIC Document Reproduction Service No. ED 409 288).

Ross, E., Cornet, J. & McCutcheon, G. (1992). Teacher personal theorizing and research on curriclulum and teaching. In E. Ross, J. Cornett, & G. McCutcheon (Eds.), Teacher personal theorizing: Connecting curriculum, practice, theory, and research, (pp. 3 -18). Albany, NY: State University of New York.

Rossman, G., Corbett, H., & Firestone, W. (1988). Change and effectiveness in schools: A cultural perspective. Albany: State University of New York Press.

Sarason, S. (1971). The culture of the school and the problem of change. Boston, MA: Allyn and Bacon, Inc.

Sarason, S. (1990). The predictable failure of educational reform: Can we change course before it's too late? San Francisco, CA: Jossey-Bass, Inc.

Schein, E. (1985). On dialogue, culture, and organizational learning. Organizational Dynamics 22(2), 40-51.

Sheehy, G. (1976). Passages: Predictable crises of adult life. New York: Dutton.

Siegal, I. (1978, May). Constructivism and teacher education. The Elementary School Journal 78(5), 333-338.

Sirotnik, K. (1983, February). What you see is what you get- consistency, persistency, and mediocrity in classrooms. Harvard Educational Review 53(1). 16-31.

Smith, R. (1982). Learning how to learn: Applied theory for adults. New York: Cambridge.

Smith, M. & Sheppard, L. (1988). Kindergarten readiness and retention: A qualitative study of teacher beliefs and practices. American Educational Research Journal 25(3). 307-333.

Smylie, M. (1991). Organizational cultures of schools: Concept, content, and change. In S. Conley & B. Cooper (Eds.) The schools as a work environment: Implications for reform (pp. 20-41). Boston, MA: Allyn and Bacon.

Smylie, M. & Conyers, J. (1991, Winter). Changing conceptions of teaching influence the future of staff development. Journal of Staff Development 12(1), 12-16.

Spear, G. & Moocker, D. (1984). The organizing circumstance: Environmental determinants in self-directed learning. Adult Education Quarterly 35(1), 1-10.

Spodek, B. (1988). Implicit theories of early childhood teachers: Foundations for professional behavior. In B. Spodek (Ed) Professionalism and the early childhood practitioner, (pp. 161-173). New York: Teachers College Press.

Stasz, C., Winkler, J., Shavelson, R., Robyn, A., & Feibel, W. (1981). Staff development for instructional uses of microcomputers: The teachers' perspective. A paper presented at the American Educational Research Association Annual Meeting, Santa Monica, CA: April 1981. (ERIC Document Reproduction Service No. ED 261 978).

Stutzman, C. (1984). Computer supported instruction in California elementary and secondary schools: A status report. A paper presented at the Annual Research Symposium, Fresno:CA: April 1984. (ERIC Document Reproduction Service No. ED 206 304).

Synder, T., Hoffman, C. & Geddes, C. (1997). Digest of educational statistics 1995. Washington, DC: U.S. Government Printing Office. (ERIC Document Reproduction Service No. ED 411 612).

Tillman, M. (1985). Relationships of inservice training components and changes in teacher concerns regarding innovations. Journal of Educational Research, 78(6), 364-371.

U.S. Government Printing Office, (1997, April). Science and technology shaping the twenty-first century. A report to the Congress. Washington, DC: U.S. Government Printing Office.

U.S. Government Printing Office. (1997, May). Technology in the classroom: Panacea or pandora's box? Hearing before the Committee on Science Subcommittee on Technology. U.S. House of Representatives. Washington, DC: U.S. Government Printing Office.

U.S. Department of Education. (1997). The condition of education. Washington, DC: U.S. Government Printing Office.

Van Manen, M. (1977). Linking practical ways of knowing with ways of being practical. Curriculum Inquiry, 6(3), 205-228.

Wade, R. (Dec. 84/ Jan. 85). What makes a difference in inservice teacher education? A meta-analysis of research. Educational Leadership, 42(4), 48-54.

Waller, W. (1932). The sociology of teaching. New York: John Wiley & Sons, Inc.

Wertsh, J. (1984, March). The zone of proximal development. In B. Rogoff & J. Wertsch (Eds.) Children's learning in the "zone of proximal development, (7-18). New directions for child development, No. 23. San Francisco: Jossey-Bass Inc.

Wideen, M. (1987). Perspectives on staff development. In M. Wideen & I. Andrews (Eds.) Staff development for school improvement: A focus on the teacher, (1-15). New York: The Falmer Press.

Winn, W. (1996). Instructional design and situated learning: Paradox or partnership. In H. McLellan (Ed.), Situated Learning Perspectives (pp. 57-66). Englewood Cliffs, NJ: Educational Technology Publications.

Wood, F., Killian, J., McQuarrie, F., & Thompson, S. (1993). How to organize a school-based staff development program. Alexandria, VA: Association for Supervision and Curriculum Development.

Wu, P. (1987). Teachers as staff developers: Research, opinion, and cautions. Journal of Staff Development, 8(1), 4-6.

Wyner, N, (1991). Unlocking cultures of teaching: Working with diversity. In N. Wyner (Ed.), Current perspectives on the culture of schools (pp. 95–107). Brookline Books.

Yin, R. (1989). Case study research: Design and methods. (Revised ed.). Newbury Park, CA: Sage Publications.

Yonemura, M. (1986). A teacher at work. New York: Teachers College Press.

Zahorik, J. (1987). Teacher's collegial interactions: An exploratory study. Elementary School Journal, 87, 385-396.

APPENDIXES

APPENDIX A

Interview Protocol

Interview Protocol

A semi-structured interview format was selected, with questions falling under three major categories: (1) general beliefs about teaching and learning, (2) relationships between technology and education, and (3) personal experiences in learning to use technology.

Formal exit interviews will be conducted once the researcher has a more through understanding of the site. Specific site characteristics and observed events will determine order and structure of questions. Additional questions may emerge from on-site observations. All respondents will be provided opening statement information that will explain what will be asked in the interview, what the information will be used for and how it will be used, and how the information will be handled. Scripts targeting each of these areas are included below. These statements will be read verbatim to each respondent. Respondents will also be provided with an informed consent form detailing voluntary participation and confidentiality of records.

Nature of the Interview

This interview is being conducted to determine how beliefs about teaching and learning influence the technology training experience. You will be asked questions about teaching and learning in relation to learning to use technology. Information gained from this interview will be used in a research study necessary for the completion of the requirements for a doctoral degree in Applied Educational Studies.

Validity Issues

The interview will be conducted according to commonly accepted procedures for interview research. Interviews will be tape recorded and transcribed verbatim for analysis. You will be provided with a copy of the completed transcript to ensure that I understood and accurately reported what was said during the interview. It is important to me that I reflect your story accurately.

Confidentiality Issues

All subjects will be coded into the research so individuals cannot be identified directly or through the coded identifiers. All collected data, including the interview tapes will be recorded and kept in a secure location. The tapes will be destroyed at the conclusion of the study.

Voluntary Consent

You will be provided with a written consent form that outlines what I have discussed with you. Please read the form carefully and sign the form if you are in agreement.

Questions about the Study

Do you have any concerns or are there any questions that I can answer about the interview process?

Sample Questions

General Beliefs about Teaching and Learning

1. Talk about factors that help or hinder teaching and learning…what about some that facilitate a good learning situation?
2. Tell about your teaching style…what gives it your personal touch?
3. Talk to me about your thoughts on teaching and learning over the span of your career.
4. Talk to me about how you think teachers influence learners.
5. What makes someone a learner?

Relationship between Technology and Education

1. How do you see the relationship between technology and your understanding about teaching and learning?
2. Please share specific successes and failures using technology in the classroom.

Personal Experiences in Learning to use Technology

1. What helps or hinders you in learning to do something new?…in learning to use computers?
2. Talk to me about your formal technology training experiences. What stands out in your mind as a particularly positive experience?…a negative experience?
3. Talk to me about the entire process of learning to use a computer for the classroom (i.e. – training, practice, experimentation, and implementation with students).

APPENDIX B

Consent Form

CONSENT FORM

I authorize Keith Restine to conduct research at the school site for a study entitled: How beliefs about teaching and learning influence the technology training experience. The project is scheduled to take approximately eight weeks. During the course of this study, the researcher will use commonly accepted research procedures such as; (1) observation, (2) interview, and (3) review of documents.

I understand that participation in this project is voluntary, that there is no penalty for refusal to participate, and that I am free to withdraw my consent and participation in this project at any time without penalty after notifying the project director/ dissertation advisor.

I understand that the interview will be conducted according to accepted procedures and that information gained from the interview will be recorded in such a manner that subjects cannot be identified directly or through identifiers linked to the subjects. Each interview will be recorded and transcribed verbatim. All collected data, including the interview tapes, will be recorded and kept in a secure location. The tapes will be destroyed at the conclusion of the study and the researcher, for a minimum of two years following the study, will maintain the data.

I understand the purpose of the study is to determine how beliefs about teaching and learning influence the technology training experience. I understand the interview will not cover topics that could reasonably place the subject at risk of criminal or civil liability or be damaging to the subject's financial standing or employability.

I may contact the dissertation advisor, Martin Burlingame, Ph.D., School of Educational Studies, College of Education, Oklahoma State University, Stillwater, OK; (405) 744-6276 should I wish further information about the research. I may also contact Gay Clarkson, IRB Executive Secretary, 305 Whitehurst, Oklahoma State University, Stillwater, OK 74078; (405) 744-5700.

I have read and fully understand this consent form. I sign it freely and voluntarily. A copy of this form has been provided to me.

Date: _____ Time _____

Signed: _____

I certify that I have personally explained all elements of this form to the subject before requesting the subject sign the form.

Signed : _____

APPENDIX C

Institutional Review Board
Human Subjects Review

OKLAHOMA STATE UNIVERSITY
INSTITUTIONAL REVIEW BOARD

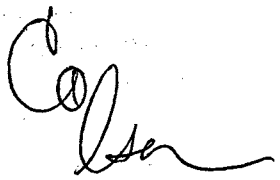
DATE: 11-24-98 **IRB #: ED-99-062**

Proposal Title: HOW BELIEFS ABOUT TEACHING AND LEARNING INFLUENCE THE TECHNOLOGY TRAINING EXPERIENCE: A CASE STUDY

Principal Investigator(s): Martin Burlingame, Keith A. Restine

Reviewed and Processed as: Exempt

Approval Status Recommended by Reviewer(s): Approved

Signature:  Date: November 24, 1998

Carol Olson, Director of University Research Compliance
cc: Keith A. Restine

Approvals are valid for one calendar year, after which time a request for continuation must be submitted. Any modification to the research project approved by the IRB must be submitted for approval. Approved projects are subject to monitoring by the IRB. Expedited and exempt projects may be reviewed by the full Institutional Review Board.

APPENDIX D

Letters

January/ February 1999

Dear :

Your recent interview has been very helpful to me for the research that I am doing as part of my dissertation. Thank you for sharing your valuable time with me.

I have attached a typed copy of the interview. Please check to make sure that it is an accurate representation of your thoughts and opinions. I want to make sure that the transcript reflects an accurate representation of your perceptions.

You can leave the revised transcript in the folder located in the workroom at your school or give it to me during my time at the school. Please contact me if you have any questions or concerns (405.744.3883). If I do not hear from you or receive your revised copy within two weeks, I will assume that the transcript is accurate.

Thanks again for sharing your valuable time.

Keith Restine

January/ February 1999

Dear :

Your recent interview has been very helpful to me for the research that I am doing as part of my dissertation. Thank you for sharing your valuable time with me. One aspect of this type of research deals with organizing the data in some manner. The following is a tentative organizational scheme useful for discussing the beliefs of different types of technology users at your site.

I have attached a tentative list of categories and themes that seemed to run throughout the interviews. Please check to see if the categories and themes listed appear logical to you. I will be available to clarify any categories or themes that require explanation. Please contact me if you have any questions or concerns (405.744.3883). I look forward to your input.

Thanks again for sharing your valuable time.

Keith Restine

VITA

Keith A. Restine

Candidate for the Degree of

Doctor of Education

Thesis: HOW BELIEFS ABOUT TEACHING AND LEARNING INFLUENCE THE TECHNOLOGY TRAINING EXPERIENCE: AN EXPLANATORY CASE STUDY

Major Field: Applied Educational Studies

Biographical:

Education: Graduated from Carlsbad High School, Carlsbad, New Mexico in May 1973; received Bachelor of Science degree in Education from New Mexico State University, Las Cruces, New Mexico in December 1977; received Master of Science degree from Eastern New Mexico University, Portales, New Mexico in May 1986; received Educational Specialist degree from Western Kentucky University, Bowling Green, Kentucky in May 1992. Completed the requirements for the Doctor of Education with a major in Applied Educational Studies with a specialization in Research at Oklahoma State University in May, 1999.

Experience: Employed by Carlsbad Municipal Schools, Carlsbad, New Mexico as a teacher from 1978 to 1987; employed by Los Lunas Schools, Los Lunas, New Mexico as a teacher from 1987 to 1988; employed by Albuquerque Public Schools as an assistant principal from 1988 to 1990; employed by Barren County Schools, Glasgow, Kentucky as a teacher from 1990-1992; employed by Yale Public Schools as a principal, federal programs director, and technology director from 1992 -1998; employed by Oklahoma State University as a visiting assistant professor from 1998 to present.

Professional Memberships: Association for the Advancement of Computing in Education (AACE), Association for Educational Computing and Technology (AECT), Kappa Delta Pi, Oklahoma Technology Administrators, Phi Delta Kappa