

COMPUTER TECHNOLOGY IN THE CLASSROOM:
SELECTED TEACHERS' PERCEPTIONS
AND INFLUENCES ON
DECISION MAKING

By

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CHAPTER 1

INTRODUCTION

How knowledge is defined and how we obtain knowledge through schools is suspended between the Industrial Age and the Information Age (Postman, 1985). The means of communication in part determines how we define knowledge (Postman, 1985). The Nintendo generation of students has been raised on three-minute images from TV and multi-media games and programs on the computer. Information presented to students using the printed word from a book conveys the same basic information to the student as an interactive multi-media presentation on the computer. However, the knowledge gained by the student is different (Postman, 1985). The computer/TV image leaves a very different impression on the mind of the viewer. Information technology, including the computer is changing the primary means of communication through which knowledge is conveyed and in the process is transforming how we define knowledge. How we define knowledge plays a key role in our view of education and raises the possibility that our orchestration of the education score may need to change as we approach the new millennium (Postman, 1985).

In the Industrial Age, problems were approached and solved in one way. True knowledge of the world was believed to exist independent of the individual's ability to perceive it (Jonassen, 1992). Everything in the world was believed to be objective and measurable. Thus, pieces of the world could be transmitted by the expert teacher to the student so they too would possess this knowledge. Knowledge in the Industrial Age is the

assimilation of an objective reality. Schools reflected this in a variety of ways and so did the teachers and students (Jonassen, 1992).

Classrooms that reflect this tradition are characterized by teachers who view themselves as the source of knowledge and understanding. This approach to knowledge acquisition is didactic in nature. The methods used are predominantly lecture presentations to the whole group and the content is objective knowledge that can be measured by an objective test. The classroom is arranged with the desks aligned in rows and all students facing the expert teacher who is delivering the knowledge to the learners (Collins, 1991).

An historical analysis of the field of education indicates that little has changed since the beginning of the twentieth century.

The basic grammar of schooling, like the shape of classrooms, has remained remarkably stable over the decades. Little has changed in the ways that schools divide time and space, classify students and allocate them to classrooms, splinter knowledge into "subjects," and award grades and "credits" as evidence of learning. In 1902 John Dewey warned against dismissing the way schools are organized "as something comparatively external and indifferent to educational purposes and ideas." In fact, he declared, "the manner in which the machinery of instruction bears upon the child...really controls the whole system." (Tyack & Cuban, 1995, p. 85)

The teacher as the director of the learning process and the purveyor of knowledge characterizes education around the world. As we are propelled into the new century and the new Age of Information, we carry with us the baggage of an Industrial Age education system.

The printed book came to prominence during the Industrial Age as the primary tool to be used in education. What was written in a book was more important than what was said because the author had time to contemplate what was to be written, revised, and written again. The book was then scrutinized by a publisher, which added another layer

of authenticity to what was being said. Books were reviewed by authorities in the field and only after much scrutiny were they used in schools. In the Industrial Age, the written word was seen as the source of true knowledge and "truth, like time itself, is a product of a conversation man has with himself about and through the techniques of communication he has invented" (Postman, 1985, p. 25). Knowledge was transferred to a written form and given credibility through the printed page. This caused a great epistemological shift. The way ideas are expressed in a written format (i.e., books, newspapers, and journals) has affected the type of ideas that have been expressed which, in turn, have affected the format and knowledge taught in our schools. The written word has fostered the detached, analytic management of knowledge.

The introduction of television was billed as the wave of the future in education. It was going to revolutionize how teachers taught. However, this technological innovation did not change the role of the teacher in the classroom. In fact, little has changed in the instructional process by using a TV. What has changed is the mindset of pupils and their preferred learning style. "The abundant flow of information [on TV has] very little or nothing to do with those to whom it [is] addressed; that is, with any social or intellectual context in which their lives [are] embedded" (Postman, 1985, p. 68). Television has created a world in which the public understanding of virtually any subject is shaped by the biases of television. Television arranges our communication environment. It informs us how to think, what to buy and how we should view the world. TV has only indirectly affected education by changing the source of knowledge of students and teachers (Postman, 1985).

Computers have been around for 30 years, but all of a sudden, because of technological advances, they are being billed as the primary source of knowledge and means of communication for the 21st century. The computer is only a way to store and retrieve vast quantities of information in a much shorter time frame than is possible with other technologies, or the human brain. However, the computer is more than just a machine. Its influence on society goes beyond the function of the item itself. This leads to a problem that is based on the theory of how computers are directing our ways of learning and knowing in the classroom (Postman, 1985).

Background of the Study

The proliferation of technological innovations in the educational setting is causing change (U.S. Congress, Office of Technology Assessment [OFTA], 1995). In every change there are a variety of institutional and individual reactions. Research to date has explored the interface between information technology and education in the following areas:

1. teacher education
2. the learning style of the Nintendo generation
3. social issues
4. organizational and administrative issues
5. the affects of gender
6. the future of education, and
7. instructional formats.

The research to date has been done from the outside looking in to the educational arena.

Few studies of schooling address how the context of teaching as information technology

is integrated into the instructional program. Studies have focused instead on the act of teaching or the interaction of teachers, students, content, and information technology. As a result, there is a knowledge void of what is actually happening in the classroom from the perspective of the teacher.

The key player in the educational process is the teacher. Buchanan (1995) and Pithers and Soden (1998) explore what happens to teachers as they learn to use technology. Buchanan examined the barriers teachers experienced when using the Internet. Pithers and Soden conducted research on personal coping strategies teachers used to mitigate stress in the work place. Cravener's (1998) focus was on faculty development when teachers were faced with major personal and institutional changes such as the introduction of information technology. Manus and Denton (1995) and Selber, Johnson-Eilola, and Selfe (1995) investigated the integration of information technology and concomitant staff development issues. As technology is introduced into the educational setting, teachers are involved in a change that they must deal with personally and professionally. Effective staff development must take place in order to assist teachers in the change process. The above cited research conducted to analyze these issues suggest the need for more effective training for teachers to cope with changes that are occurring.

A second research area has focused on how the Nintendo generation of students is influenced by the cyberspace culture in which they are coming of age. Television and the proliferation of computers have influenced how students learn outside the classroom, which in turn has a profound affect on the classroom (Brothers, 1999; Kamppinen, 1998; Postman, 1985). Computer-assisted instruction techniques and ways to motivate the new

generation of learner have been explored as part of the K-12 curriculum (Brothers, 1999; Cordova & Lepper, 1996; Kamppinen, 1998; Kinzie, Sullivan, & Berdel, 1998; Postman, 1985).

Technology-enhanced learning environments, computer-mediated communication, and the ways they change the patterns of how people interact is a third area of study that has been conducted. As interaction patterns change, so do social structures. The implications and issues surrounding courses utilizing computers in the classroom and the need for computer-mediated communication are currently very hot topics. Technology-enhanced learning environments and on-line activity are changing communication patterns. This is causing a shift in traditional relationships by altering the choices available, opportunities for interaction, and shifting the power base. All of this is causing a change in social structure (Brody, 1996; Fanderclai, 1995; Shapiro, Roskos, & Cartwright, 1995; Xu, 1997).

Current research addresses a fourth area-- organization of the schools. A myriad of issues has arisen as a result of the changing priorities caused by the financial impact in introducing technology into the schools. Budgetary priorities are changing, which in turn impact the educational process (Dertouzos, 1998). Administrative techniques have been explored and suggestions made on how to cope with this wave. Politically, the gap between schools that have information technology resources and those that do not is becoming a quagmire (McConnaughey & Lader, 1997). Physical alterations being made to schools and research into the best designs and how to plan buildings to meet future technology needs are almost out of date before being published. The operation of the schools, including the use of information technology, is being explored from a variety of

perspectives (Dertouzos, 1998; Kearsley, Lynch, & Wizer, 1998; McConnaughey & Lader, 1997; Morton, 1996; Young & Smith, 1996).

Gender and its effect on learning and the use of information technology by students, teachers, and administrators, continues to be researched. Content specific studies, grade level analysis, and patterns of use have shown that gender does have an impact on the educational process (Brosnan, 1998; Dorney & Flood, 1997; Kelly, 1991; Lage, 1991; Whitley, 1997).

Researchers are taking findings and projecting them on a 21st Century scenario. We are led to believe that society as a whole, including education, is experiencing an upheaval (Mehlinger, 1996). The proliferation of information technology in society and in our schools is rapidly changing what is happening in the classroom (Irving, 1999). The projected role of the teacher in the 21st century is different (Irving, 1998). The time frame in which we expect major changes to occur is being compressed (Rainey & Staples, 1995; Van Horn, 1994).

The effects of information technology on learning have been explored from multiple perspectives. Preliminary indications are that there is not a significant difference in learning. Although computers have been billed as making education better and more efficient, this has not come to fruition (Berson, 1996; Cuthell, 1998; Khalili & Shashaani, 1994; Schmitt & Slonaker, 1996).

Thus, we know what happens to teachers and students as they learn to use technology. We know the ways information technology has changed people's interaction patterns and the impact on the schools. Learning has been affected by information technology and it has been shown that gender plays a role in how and when information

technology is used. However, this study proposes to look at computer technology from the teacher's perspective and influences on their decision making.

Statement of the Problem

The foundation upon which our current educational system lies is the Industrial Age. In this age, theorists focused on how knowledge could be transferred effectively and efficiently from the teacher to the student. Industrial Age schooling is based on the application of rational, scientific principles to the management of the learning process within classrooms. Schools exist as agents of social transmission in which the knowledge and skills of one generation are passed on to succeeding generations. With the recent proliferation of computers in the classroom, a restructuring movement has emerged. Major changes are advocated in what students learn by allowing students to construct their own knowledge and by promoting exploration, collaborative group work, and critical examination rather than acquiring information from teachers and textbooks. Schools and teachers are caught in the midst of this upheaval (Fosnot, 1996).

The change process is intricately woven in introducing computers and other forms of information technology into the educational setting (Fullan, 1991; Hargreaves, 1994; Sarason, 1996). Our beliefs and resulting acceptance or rejection of technology in our lives may affect how and when we use these instruments (Brousseau, Book, & Byers, 1988). Research has focused on this process and influences how teachers function in the classroom.

The teacher is the primary wheel around which the entire educational process turns. What has not been examined are teachers' decisions regarding the use of information technology from their perspective.

Research Questions

The following research questions guided this study.

1. What are selected teachers' perspectives about the use of information technology?
2. What influences selected teachers' decisions about the use of information technology in the classroom?

Purpose of the Study

The purpose of this study was to understand how teachers make decisions about using information technology in the classroom. The decisions were viewed from the teachers' perspective. The current research aimed to provide insight into what influenced the decision-making process of the teacher.

Conceptual Framework

For years we have studied life in schools (Jackson, 1968; Johnson, 1990; Lortie, 1975). A panoramic view has been created of what goes on in the classroom. Research has addressed the beliefs of teachers and the influences on the decisions they make on what and how they teach (Brousseau, 1988; Eisenhart, Shrum, Harding, & Cuthbert, 1988; Hannafin & Freeman, 1995; Holt-Reynolds, 1992). This study focused on the teachers' beliefs and perspectives of issues related to their decisions regarding information technology as part of their instructional process.

According to Stake (1995) a conceptual frame is a way to express big ideas or themes that give focus to a study. The conceptual frame,

Draw[s] us toward observing, even teasing out, the problems of the case, the conflictual outpourings, the complex backgrounds of human concern. [The conceptual frame] help us expand upon the moment, helps us see the instance in a more historical light, helps us recognize the pervasive problems in human interaction. (Stake, 1995, p. 17)

The conceptual frame is illustrated in Figure 1. On the left hand side, Life in Schools in the Industrial Age is represented. In the Industrial Age schooling is based on the application of rational, scientific principles to the management of the learning process within classrooms. The teachers' beliefs reflected this model and impacted their decisions on what and how to teach. Teachers believed they were the knowledge experts and their job was to pass on this knowledge to the students. On the right hand side of the model is Life in Schools in the Information Age. In this model students are allowed to construct their own knowledge which results in a concomitant change in the role of the teacher to a facilitator. In the Information Age, teachers promote exploration, collaborative work and critical examination of information. The integration of information technology and primarily the computer is a driving force in this transformation. Teachers may exist anywhere on the continuum from left to right. This study examined how teachers made instructional decisions regarding the use of information technology. Teachers' beliefs were explored as part of the decision making process. The perspective was that of the teachers looking at the process from within.

Tyack and Cuban (1995) describe life in school as being defined by what they call the grammar of schooling.

Established institutional forms come to be understood by educators, and the public as necessary features of a "real school." They become fixed in place by everyday custom in schools and by outside forces, both legal mandates and cultural beliefs, until they are barely noticed. They become just the way schools are. (p. 86)

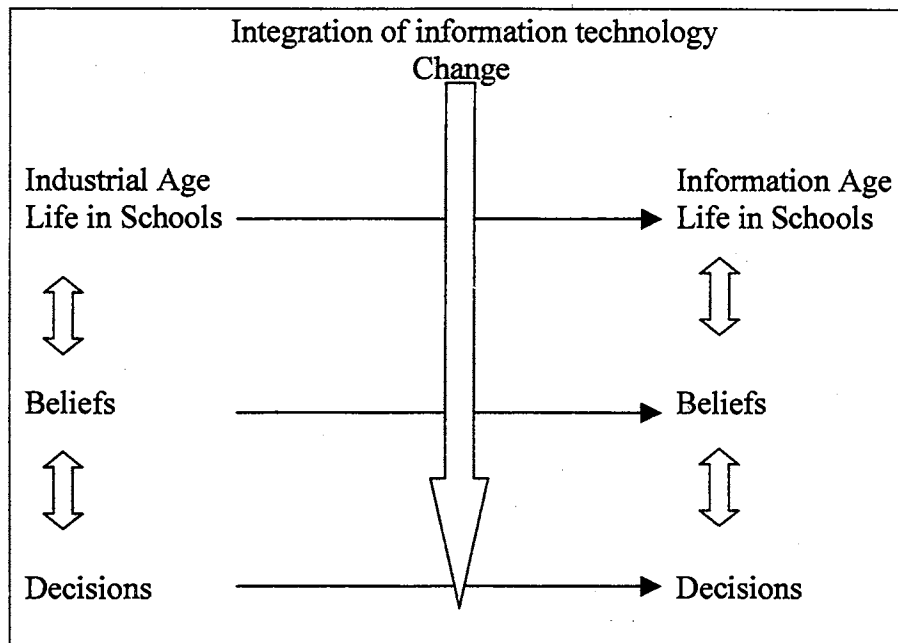


Figure 1. Conceptual Frame

The grammar of schooling came about in response to the need to provide a standardized way to process large numbers of people. Over time the grammar was easily reproducible. Laws, institutional customs, and beliefs became tied to the Industrial Era scaffolding upon which our current educational system is built. According to Jackson (1968), "In a fundamental sense, school is school, no matter where it happens" (p. 7). Life in school is predictable wherever you are.

Eisenhart, Shrum, Harding, and Cuthbert (1988) define a belief as, "...an attitude consistently applied to an activity..."(p. 54). Beliefs help us determine the direction we are headed and they also help us to anticipate future events. People in a group can be expected to share common beliefs. Teachers in an educational setting may share common views and beliefs. Beliefs help to form the teacher culture and the culture of teachers impacts beliefs. It is a symbiotic relationship. Brousseau, Book, and Byers (1988)

suggests "...the effects of the teaching culture in shaping a teacher's educational beliefs are pervasive enough to span school settings (i.e. urban, suburban, and rural) and to minimize differences between beliefs of male and female teachers" (p. 33).

Life in schools as we know it is linked to the beliefs of teachers. This study looked at how the use of information technology (i.e. computers) affected teachers' decisions from the teachers' perspective. The conceptual frame helped me focus on and understand the complex nature of the case. The conceptual frame was the conceptual organizer for the data collection and analysis. Because the research was based on the teachers' view of reality as constructed by their interactions with their social world, qualitative research methodology was used to conduct the study.

Significance of the Study

Over the past five years, computers and other forms of information technology such as graphing calculators have taken on an increasingly important role in the classrooms and in the office of the schools where I have been an administrator. In our school district teachers and administrators continue to receive training in specific skills related to the computer including word processing, grade programs, and means to integrate computers into their instructional program. We have been pushed into an increasing use of computers in order to carry out our daily duties. On the two extremes we have staff members who embrace the continued expansion of computer technology while others only use computers minimally, only when they are forced to do so. When I have talked with reluctant teachers about why they don't use computers, the usual response was that they were not good with machines. A second reason was their nearness to retirement. They were not interested in changing the way they taught, and they saw the

use of computers as requiring such a change. On the surface, it was evident that changes were occurring, but I continued to wonder about what was happening from the teachers' perspective and what role their own beliefs had on their decisions. It appeared that some teachers had made a mind-set shift in their beliefs and decisions to an Information Age paradigm and I wanted to understand more about how they thought this change came about for them.

Information technology will continue to impact our schools, and the more I understood what was happening to teachers from their perspective, the better I would be able to facilitate the necessary change process within the school. This is what led me to conduct this study. I wanted to take the time and focus my attention on this issue because it would be of benefit to me as well as other administrators. I believed it would also be of benefit to teachers because it would give them insight into the relationship between life in schools, their beliefs, the change process and their decisions.

For many, change in education is tied to the concept of reform. The premise of reform is that we can improve what we are doing in education. The promise that technology will help us do things faster and better is drawn into the education equation. This study contributed to the understanding of how teachers make decisions about using information technology in the instructional process.

This study has significance for contributing to practice and theory. Research on how the introduction of information technology in the classroom influenced the decisions of the classroom teacher helps us to further understand how life in school relates to the beliefs of teachers.

Research from the perspective of the main player on the stage, the teacher, provided an important practical frame of reference. In so doing, this study added to the literature on ways to improve teacher practice. Using the teacher as the key player in the process and identifying influences from her/his perspective also contributed to the knowledge base related to educational planning, information technology, and educational administration.

Inquiry Design

To understand the complex interrelationships that exist, I, as the researcher had to look at the particulars. To understand the issues, I looked at testimonials, interviews, and key events that represented the teachers' interpretation of how the culture of their classroom was being affected by information technology. I was the primary instrument for data collection and analysis. Through narratives and observations, I gained an understanding about the phenomena under investigation.

Research Methods

I read numerous studies that addressed a myriad of issues relating to information technology use in the classroom. Many of the studies have been done from the point of view of the researcher, examining an issue as an isolated construct. These studies have explained some of the issues related to the use of information technology in the classroom and have been beneficial in adding to the knowledge base. However, a study from the teachers' perspective helped to place the pieces of the jig-saw puzzle of various explanatory pieces of research into the frame from which it should be viewed, that of the teacher.

The purpose of this study was to understand how teachers make decisions about using information technology in the classroom from their perspective. The issues were intricately woven into the social, historical, and political fabric of education, the school and the classroom in particular. The decisions were viewed from the teachers' perspective and, therefore, the personal contexts of the teachers were central to the understanding of the issues. The current research aimed to provide insight into what influenced the decision-making process of the teacher (Stake, 1994).

Naturalistic inquiry, which focuses on meaning in context, requires a data collection instrument sensitive to underlying meaning when gathering and interpreting data. Humans are best-suited for this task--and best when using methods that make use of human sensibilities such as interviewing, observing, and analyzing. Nonprobability forms of sampling and inductive data analysis are consistent with the goals and assumptions of this paradigm.... (Merriam, 1988, p.3)

Merriam goes on to point out that two design characteristics upon which a case study should be based are the nature of the research question and the desired end product. Stake (1994) explains the nature of the research question by comparing two concepts. Explaining a phenomenon is different from wanting to understand it. The purpose of this study was to understand the case. The process became more important than the outcomes or products.

Selection of the site

A secondary school in England was the site for the research. The school was chosen based on the level of information technology use by the school as a whole. A member of the local university Department of Education faculty was consulted for recommendations based on her experience and knowledge of secondary schools in the area. Schools vary with their commitment to and reputation for using information

technology. Thus, a school was chosen that was seen as a user of information technology as part of the instructional process.

Selection of Informants

A purposeful sampling of information rich cases from whom I could gain information important to the purpose of the research was used (Merriam, 1998). They were veteran teachers with over five years of experience. Technologically advanced and those just beginning to use computers were selected. The selected teachers were in various content areas.

Data Collection Strategies

"The data collection techniques, as well as the specific information considered to be data in a study, are determined by the researcher's theoretical orientation, by the problem and purpose of the study, and by the sample selected" (Merriam, 1998, p. 70). Data was collected through interviews, observations, and artifacts. I interviewed teachers and other school personnel (Merriam, 1998; Yin, 1989). Other school personnel were identified based on information about influences collected during the interview and observation process (Kidder, 1981; Merriam, 1998). I conducted observations in the classrooms and in other areas of the school where computer technology was used as part of the instructional process. Interviews were audio taped and transcribed, and I scripted observations. Sketches were made and photographs taken of the environment in which the observations took place. Artifacts, such as the teachers' planning book, school policies and procedures, and training materials, were sought out that contained information or

insights relevant to the research questions and were included as part of the research (Erlandson, Harris, Skipper, & Allen 1993; Merriam, 1998).

Data was gathered to address the following focus areas:

1. the uses of information technology
2. the teachers planning processes
3. perceptions of the teachers
4. the contexts within which information technology is used
5. teacher beliefs.

What forms of information technology were being used, when, and by whom were determined by direct observation. Observations were conducted at various times of the day and at different periods during the research. Artifacts were collected to represent process as well as format issues.

Data Analysis

Using the conceptual frame as a foundation, data from a number of sources including observations, interviews and artifacts were analyzed to look at teachers' perceptions and to identify the influences on teacher decision making.

Transcribed interviews were coded in order to identify emergent themes and concepts that led to the identification of patterns and influences. Copies of the interviews and identified themes and concepts were shared with the informants in order to verify that the interpretation of identified factors were in fact what they appeared to be from the perspective of the teacher (Erlandson et al, 1993; Merriam, 1989).

Observations were recorded, coded, and analyzed to identify actions related to how the infusion of computer technology was affecting life in the classroom. Critical

incidents were extracted from the data to show where the perceptions differed and where they were the same. These were analyzed with the information from the teacher interviews and compared to what happened in practice in the classroom. Observations augmented and confirmed issues brought out in the interviews (Merriam, 1998; Stake, 1994).

The combination of interviews and observations provided a way to compare information as a means of triangulation. The observations identified typical situations and influences not brought out in the interview process. Using both methods in tandem enhanced the database. An analysis of these issues led to an understanding of the influences on the decision making process (Lincoln & Guba, 1985).

Teacher lesson plans and other school documents were examined. Artifacts were used to illuminate and nullify extraneous influences. The intent was to look at information technology in the classroom through the teachers' lens and from this perspective to determine the influences on the decision making process (Merriam, 1998).

Researcher Bias

Because the researcher is the primary instrument of data collection, all observations and analysis must be filtered through the researcher's lens, which includes her/his values and perspectives on education, the culture of schools, and information technology. These biases include personal as well as professional experiences. Through over 20 years experience in public schools as a teacher and an administrator, I have extensive knowledge and understanding of the American education system, the culture of schools, and the use of information technology as part of the educational program. I have had experience in setting up the infrastructure for school based information technology

systems and in developing concomitant staff development programs. I am an avid user of information technology personally (Erlandson et al, 1993; Merriam, 1998).

Summary

The purpose of this research was to investigate teacher decisions regarding the use of information technology in the classroom. In particular, it was to look at what was happening in the classroom from the teachers' perspective. A British school provided the site for the case study. Across-case data collection and analysis aimed to provide insight and understanding into the issues related to the injection of computer technology into the classroom.

A review of the literature is contained in Chapter II. Chapter III will provide a discussion of the inquiry design. Chapter IV presents the data collected during the study using thick rich description, Chapter V is my analysis of the data and the final Chapter VI contains conclusions and recommendations.

CHAPTER II

REVIEW OF THE LITERATURE

This chapter provides a review of the literature on: (1) teachers' beliefs, (2) studies and research related to the use of technology in schools, (3) life in schools based on the Industrial Era model, and (4) the change process. The first section examines the concept of teachers' beliefs and the tie to instructional practice. The second section on the studies and research related to the use of technology in schools establishes that there is a knowledge void of what is actually happening in the classroom from the perspective of the teacher. Sociocultural conditions of schools as workplaces based on an Industrial Era model will be described in the third section on life in schools. The introduction of information technology is a change. Although this research is not specifically about change, it is linked. Therefore, the dynamics of change will be explored in the final section.

Teachers' Beliefs

Beliefs are the attitudes that a teacher has toward students, colleagues, parents, administrators, a task, an action or an event. These beliefs are strong and have a profound influence on how a teacher orchestrates her classroom. Beliefs help the teacher determine the direction she is headed and helps the teacher anticipate future events. Beliefs help to form the teacher culture and the culture of teachers impacts their beliefs. It is a symbiotic relationship.

Eisenhart, Shrum, Harding, and Cuthbert (1988) defined a belief as, "...an attitude consistently applied to an activity..." (p. 54). Kagan (1992) applied this definition to

education by saying that teachers' educational beliefs are implicit, "...often unconsciously held assumptions about students, classrooms, [technology], and the academic material that is being taught" (p. 65). Kagan believes that the strong personal belief systems of teachers arises from the uncertainties of classroom teaching. Teachers need to be able to give meaning and direction to the ambiguities they experience on a daily basis. Their belief system is their road map and the lens through which they view their work. The belief system of the teacher helps them to interpret situations in certain ways and as a result certain courses of action are favored over others.

Kagan (1992) found teachers' beliefs tend to be associated with a congruent style of teaching that is evident across different classes and grade levels. Kagan also found that teachers' beliefs appear to be relatively stable and resistant to change.

Eisenhart et al. (1988), on the other hand, point out the factors that appear to influence beliefs and that may cause them to change are:

1. socialization pressures
2. intensive interaction between teachers within a school who are faced with common problems
3. the teachers interaction with the structural characteristics of the school and the school system
4. the teachers professional goals
5. and the experience over time of the teacher.

Brousseau, Book, and Byers (1988) conducted a survey on educational beliefs of 391 students who were just entering the teacher education program at Michigan State University from the spring of 1983 through the winter of 1994. They compared the

survey results of entering students with the views held by 382 experienced faculty members who were employed as full time classroom teachers in Michigan. Their findings suggest that the experience of working in a school as a teacher over time had a measurable impact on the teachers' beliefs. Brousseau et al. suggests "... the effects of the teaching culture in shaping a teacher's educational beliefs are pervasive enough to span school settings (i.e., urban, suburban, and rural) and to minimize differences between beliefs of male and female teachers" (p. 33).

Eisenhart et al. (1998) conducted a review of the literature on teacher beliefs. Based on their findings, they designed a pilot study to support the domain structure they had developed. Their review produced 11 beliefs organized into three domains that appeared to be shared by the majority of teachers represented in the literature. The three domains are based on the teachers' perceived level of responsibility, expertise, and control. In the first domain where teachers saw themselves as having a high degree of responsibility, expertise and control the literature revealed that,

...teachers view the classroom environment and the instructional activities in it as their responsibility. They take pride in the activities they direct and control there; they believe that they have the knowledge and training to create the best learning situation for their students. Teachers feel rewarded when students show signs of learning and enthusiasm and when other adults recognize teachers' efforts to help students learn. (p. 56)

The second domain reflected an ambiguous orientation toward areas in which the teachers' responsibility, expertise, and control were unclear or unsupported. In this domain, control is shared with other teachers, administrators, and parents with a belief that teaching success is beyond the teachers' total control. Students' success is tied more to the level of support and resources from home than from what the teacher is actually able to do. They found that teachers believed that the hardest students to teach were those

from a low socioeconomic background. Teachers generally believed that the demands that were put on them for extra activities and work sometimes went beyond what was humanly possible. The new demands for time placed on them by the injection of technology is an example. The fifth belief in this domain is that teachers have not received due compensation for all their hard work.

In the third domain, teachers felt they had little responsibility, expertise, and control. Teachers believed that they did not have the expertise to develop curriculum, and non-instructional duties such as textbook design, cafeteria duty, and fixing a computer infringed on their primary responsibilities.

The pilot study conducted by Eisenhart et al. (1998) used an Heuristic Elicitation Methodology. The procedures involved respondents who gave a full range of their views and attitudes toward teaching. The responses elicited in the first phase were used to construct focused interviews. A belief matrix was used in the interviews to elicit from the respondents their beliefs about all combinations of the attitudes and activities elicited in the first phase. The findings of the pilot study support the domains established as a result of the literature review. Eisenhart et al. offer this three domain "belief system" as a way to think about what teachers believe and a means of systematically assessing the beliefs of a sample of teachers.

The assumption in any discussion about teacher beliefs is that there is a consistent tie between teachers' beliefs and classroom life. Fang (1996) points out that the complexities of classroom life may constrain the teacher's ability to attend to her beliefs and to provide instruction which is aligned with theoretical beliefs. Teachers may also experience, "... a personal conflict between their beliefs about control and structure in the

classroom and the active learning engendered by the use and presence of technology" (Heflick, 1996, p. 3).

Honey and Moeller (1990) found that:

Unless teachers are personally ambivalent about computers or have lacked the opportunity to get involved with computer technology, it appears that their educational beliefs play an important role in how they choose to appropriate and make use of technologies in the classrooms. (p. 12)

Their study was conducted in two school districts in New York State that had made special efforts to promote the use of information technologies. Interviews were conducted in elementary, middle, and high schools. One district was urban and racially diverse, and the other school was suburban with a largely white upper-middle class population. The interviews focused on educational beliefs, classroom practice and objectives, the ways teachers conceptualized the relationship between technology and education, the means by which high-tech teachers integrated technology into the curriculum, and the vision teachers used to imagine future classroom environments. Based on their analysis they grouped teachers into four categories:

1. Progressive Practice and Successful Technology Integration
2. Progressive Practice and Technological Ambivalence
3. Progressive Practice and Lack of Opportunity
4. Traditional Practices and Technological Refusal

The teachers who were placed in the technological ambivalence category were teachers whose educational beliefs were student-centered but they were reluctant to use computer technology because of personal fears and inhibitions. Teachers who adhered to traditional practices and refused to use technology gave two main reasons: (1) they feared that computer technology might alter their relationship of control and authority over the

students; and (2) they felt overwhelmed by their current job responsibilities and believed they did not have time to take on the added burden of learning about computer technology. The teachers classified as high-tech all used educational practices reflective of the Information Age paradigm such as collaboration, project-oriented work, and hands-on activities with their students. Even though three out of the four groups of teachers held the same student-centered beliefs, their classroom activities differed significantly depending on the availability of computer technology or their personal fears and inhibitions which prevented them from becoming high-tech users.

The introduction of computer technology is a change that confronts the belief structure of teachers. Some teachers are able to use their current belief structure to facilitate the integration of computer technology into the curriculum. Other teachers with the same basic student-centered belief structure are unable to take advantage of the technology because of their own fears and inhibitions or because of a lack of equipment and opportunity. Teachers whose beliefs are grounded in a didactic Industrial Age format either refuse to use computer technology or only use it to support their traditional classroom structure. When computer technology meets conventional beliefs and institutional restraints, something has to change (Honey and Moeller, 1990).

For computers to make a difference in how students experience schooling will require teachers and administrators to modify their concepts of appropriate and inappropriate teaching behaviors, to reprioritize the value of different types of instructional content, and to change habits and assumptions [beliefs] that guide their classroom and school management strategies. Computers and software may be a possible vehicle or model for providing curricular enhancement for teachers and students to use, but the presence and availability of computers will not assure (nor even make substantially more likely) that changes in education will occur. (Becker, 1991, p. 8)

Technology in the Schools

This section discusses studies and research related to the use of technology in schools and establishes that there is a knowledge void. What is actually happening from the perspective of the teacher in the classroom when computer technology is introduced is decidedly absent from the literature. The first section is a review of the literature related to what happens to teachers as they learn computer technology. The teacher is the key player in this regard. The second section discusses student learning styles. The changes in social structure as a result of information technology are examined in the literature in the third section. Organizational issues in the literature related to the "digital divide" are the focus of the fourth section. Access to resources based on gender, income, and race is grouped under this heading. A review of gender issues in the literature is contained in the fifth section on gender and technology. Projections on a 21st century scenario are explored in the final section in this review of literature on information technology in the schools.

The Teacher as the Key Player

In 1993, the U.S. Congress requested the Office of Technology Assessment (OTA) to look at the issue of teachers and technology in K-12 schools. OTA reviewed research on teachers and technology, as well as state, district, and school technology efforts. They analyzed evaluations of federal technology-related programs and conducted extensive interviews of school personnel at all levels.

Key findings of this report include:

1. The number and variety of technological resources available in schools is increasing at a rapid rate.
2. Today's technologies are an important tool for the teaching trade.
3. Despite the availability of computers in schools, the use of them varies considerably from teacher to teacher and from school to school.
4. Most teachers have not had adequate training in the use of the new technologies.
5. Although most teachers have had basic training in such things as word processing, they have received little training in how to integrate technology into their instructional program.
6. College and University Departments of Education do not see technology as central to teacher preparation.

OTA found that when the needs of teachers were discussed in relation to technology, the conversations centered around hardware resources and short-term training instead of focusing on the integration of technology and a potential change in the role of the teacher. OTA emphasized that future research should center on teachers' perceptions of how technology can help them improve instruction and how teachers see their classroom changing as a result. These are keys to understanding and coping with the change process, beyond the scope of more and better staff development and faster computers.

It was evident from this study that technology is changing the way that some teachers teach. Some teachers use technology in a traditional "teacher-centered" approach, such as drill and practice for mastery of basic skills, or to supplement teacher-

controlled activities. On the other hand, some teachers use information technology to support more student-centered approaches to instruction, so that students can conduct their own scientific inquiries and engage in collaborative activities while the teacher assumes the role of facilitator or coach (U.S. Congress, OTA, 1995). The second approach reflects an Information Age constructivist educational paradigm, which holds the possible way for teachers to take advantage of new technologies instead of applying them to traditional instruction (Fosnot, 1996).

Factors that influence the use of technologies by teachers according to the OTA report include:

1. Time to master the new skills.
2. Availability of appropriate training.
3. Diversity of teachers and their desire and willingness to learn new skills.
4. Beliefs of teachers.
5. Pedagogical practices of the teachers.
6. Availability of onsite computer support.
7. Policies that encourage teacher experimentation and collaboration.
8. Compatible assessment and evaluation systems of students.

Based on the OTA report, educators and administrators should be looking at the "big picture" as well as dealing with the daily impact and implementation of technologies in the schools. The "big picture" should include an awareness of the fundamental cultural shift that is happening in relation to the infusion of technology into society at large. The beliefs of teachers and their pedagogical practice are being influenced from within the schools as well as from without.

Technology impact and implementation issues are the focus of Buchanan's research. The purpose of Buchanan's (1995) project was to explore the barriers encountered by primary school teachers in Queensland, Australia, when using the Internet. Teachers were initially provided with a one-day training session with additional follow-up and support throughout the school year 1994. The primary barriers encountered by the teachers were technical, equipment, and connectivity problems. This had a negative effect on the attitude of the participants. The second major barrier was time. Having enough time to learn and explore the Internet during the duty day was next to impossible. This meant that teachers had to find time at home and/or out of school hours. In the concluding remarks, Buchanan (1995) noted that, "Schools, and particularly teachers, have resisted technological change. The deployment of these technologies has rarely empowered teachers. While the observation is often made that the role of the teacher is changing but the teacher is not, little emphasis is placed on redefining the role of the teacher" (p. 7).

The U.S. Secretary of Education, Richard W. Riley, informed the National Press Club in his Annual Back to School Speech in September, 1998, that in the next decade the United States would need 2.2 million new teachers in order to meet the needs of the rising population of school age children and to replace nearly a million teachers nearing retirement. Secretary Riley pointed out that the training these new teachers receive will provide the foundations for their educational careers.

In the spring of 1998, the International Society for Technology in Education (ISTE) under the direction of researchers Moursand and Bielefeldt surveyed 416 schools about how they were preparing new teachers to use information technology in their work.

This represents 1/3 of U.S. schools, colleges and departments of education. They concluded that,

Most institutions report that [Information Technology] IT is available in the K-12 classrooms where student teachers get their field experience; however, most student teachers do not routinely use technology during field experience and do not work under master teachers and supervisors who can advise them on IT use. (p. 2)

They also found that the amount of training in stand-alone Information Technology (IT) courses did not correlate with the skill level of the teachers or their ability to integrate Information Technology (IT) into teaching.

Pithers and Soden (1998) conducted research on personal coping strategies teachers use to mitigate stress in the work place. They explored this issue because most of the research on stress has dealt with causes, effects, and how to reduce stress instead of looking at what the teacher brought to the situation. In Scotland and Australia, 332 educators were given The Occupational Stress Inventory. The results indicated that teachers with a high 'personal resource' score also had lower strain scores. Personal coping resources include social support at work, self-care, and positive self-thought. They pointed out the importance of strengthening individual personal coping resources in this time of technological and educational change.

Cravener (1998) pointed out that, "Fundamentally, resistance to adopting new technology is not about technology; it is about the feelings and anxieties and fears people have when faced with major personal and institutional changes" (p. 6). This journey into unknown territory for many educators is approached with a great deal of trepidation and anxiety. The world around them is continuing to change at a rapid rate. In order for teachers to learn more about technology, staff developers must pay close attention to affective issues and the principles of adult learning.

Affective issues, such as anxiety aroused by cognitive dissonance (caused by conflict between the educator's beginner roles with instructional technology and/or Internet communications and his or her normal view of the self as a scholar and discipline expert) may play a substantial role in the willingness of faculty members to participate in IT workshops. (Cravener, 1998, p. 2)

A second staff development issue addressed by Cravener (1998) was administrative support and recognition of the importance of the integration of technology into the educational program. Technology skills must be considered by the administration to be necessary and highly regarded skills necessary to be an effective teacher in the 21st Century. Active leadership is required in order to gain insight into the change process with attention paid to policy and practice implications. The first step is to identify key individuals who are interested in moving forward technologically and who have some knowledge of the change process. These staff members can form a leadership group who will support and assist the administration with the needed changes. Identifying the specific needs of individual staff members is the next step. Staff development sessions in individual and small groups in the privacy of their own classrooms should follow.

In addition to overcoming some potential social or political problems, using the learner's computer for teaching purposes is the best possible strategy for ensuring that he or she has access to needed hardware and software after the training sessions end, and for promoting adoption of the new learning. (Cravener, p. 5)

Forces that promote change are a third key staff development issue. Social, economic, and political demands are being put on schools, which help to drive the thrust toward technological competency. Teachers need to know how they and the educational program will benefit from learning to use new technology. Seeing the relevance to their lives as well as the lives of their students is an important factor.

Manus and Denton (1995) addressed Cravener's three key issues in their 1992 project to investigate evolving technology systems at participating school sites in Texas

and to provide staff development in the integration of instructional technology. Eight sites were chosen that reflected the state's diverse backgrounds with respect to culture, social, and economic indicators. One high school, one junior high school, three middle schools and three elementary schools were chosen.

Each school had a leadership team that included the principal, a representative from the regional service center, two teachers, a parent, and a business partner. The site council coordinated activities based on survey data collected at the school and the culture and social needs of their particular school. Each school maintained autonomy concerning staff development and the implementation of technology. This resulted in teachers having varying degrees of skills at the end of the project, and the alignment of technology with the curriculum was different depending on the school.

A needs assessment was conducted in order to determine the technology competencies of the teachers. The results indicated that the staff needed training from a skilled technologist. Weekly half-day training sessions were conducted at each school for the first year of the program. Almost \$2 million was spent to establish a technology infrastructure in the selected schools and \$627,836 was spent on staff development.

Manus and Denton found that one of the primary sources of frustration was the discrepancy in the levels of technology expertise and willingness to learn new skills among teachers in the schools. Teachers who were resistant or anxious required extra individual attention from the trainer at the expense of those teachers who were highly motivated and/or skilled. A second problem for staff developers and the site council was how to get teachers to focus on the integration of technology instead of maintaining a focus on the use of software packages.

An analysis at the end of the study indicated there had been a significant change in the overall technological skill levels of teachers and a subsequent change in teacher performance in the classroom. Along with the change in the amount of integration of technology came a desire by some schools to change their curriculum in order for it to be aligned with the use of technology. In schools where there was a high level of integration of information technology into the curriculum, it was noted that there was a more student-centered approach to learning. As students became more independent producers of products, teachers turned to authentic assessment.

Because each school was given autonomy to use resources and direct the staff development program, discrepancies were noted at the end of the project in the level and type of technology integration by teachers. Leadership and the culture of schools were felt to be at the heart of the discrepancies. However, Manus and Denton's study did not delve into these issues.

Selber, Johnson-Eilola, and Selfe (1995) saw institutional policies, available resources, enthusiasm, and skills of teachers as factors that constrain the staff development process. They wanted teachers to look beyond these constraints to explore learning about information technology in three overlapping contexts. They believed that teachers should become technology critics as well as technology consumers and users. In the second context, they stressed the importance of not separating the learning of technology from the specialization's of the teacher and the profession. "In fact, perhaps the most pressing issues facing the field require interdisciplinary lines of inquiry that primarily address complex literacy issues, or how individuals make meaning with texts in a wide range of social environments and across media" (Selber, et al., 1995, p. 582). The

third context addresses teachers' tendency to try and apply technology to old ways of communicating instead of being "...viewed in more robust ways as a complex set of social practices through which meaning is made collaboratively among groups of writers, subject-matter experts, readers of technical discourse, and educated citizens..." (p. 581). Selber et al. view the learning of technology skills from a constructivist point of view whereas Cravener's approach was based on more traditional learning constructs (Fosnot, 1996).

The key player in the educational process is the teacher. Buchanan (1995) and Pithers and Soden (1998) explored what happened to teachers as they learned to use technology. Buchanan (1995) examined the barriers teachers experienced when using the Internet, primarily technical, equipment, connectivity problems, and lack of time to learn new skills. Pithers and Soden conducted research on the personal coping strategies teachers used to mitigate stress in the work place. Their results indicated that teachers with a high degree of personal resources also had lower levels of stress as they learned about and began to incorporate computer technology into their classrooms. Cravener's (1998) focused on faculty development when teachers were faced with major personal and institutional changes such as the introduction of technology. The three key staff development issues identified by Cravener were the need to pay attention to affective issues, the need for administrative support, and the need to ensure that teachers saw the relevance of computer technology in their lives. Manus and Denton (1995) and Selber, Johnson-Eilola, and Selfe (1995) investigated the integration of instructional technology and concomitant staff development issues. Manus and Denton found that the primary source of frustration in the staff development process was the discrepancy in the levels of

technological expertise and willingness of the teachers to learn new skills. Selber et al. pointed out that institutional policies, available resources, enthusiasm, and skills of the teachers were the factors that most constrain the staff development process.

The literature has explored what happens to teachers as they learn to use technology. How teachers learn new skills and the affective repercussions have led researchers to explore staff development issues which in turn affects how technology is integrated into the classroom. Based on the research, these issues appear to be similar whether the study took place in Australia, Scotland, or the United States.

Student Learning Styles

The Nintendo generation of students is being influenced by the cyberspace culture in which they are coming of age. Television and the proliferation of computers have influenced how students learn outside the classroom, which in turn has a profound effect on the classroom (Brothers, 1999; Kamppinen, 1998; Postman, 1985). Computer-assisted instructional techniques and how to motivate this new generation of learner has been explored as part of the K-12 curriculum (Cordova & Lepper, 1996; Kinzie, Sullivan, & Berdel, 1998).

Postman (1985) points out, "...that the introduction into a culture of a technique such as writing or a clock is not merely an extension of man's power to bind time but a transformation of his way of thinking--and, of course, of the content of his culture" (p. 13). The Nintendo generation of students has been raised with television and computers as a primary influence on what they do and how they think about the world.

Nintendo generation students have been raised by the very powerful curriculum of television and computers. Neither media requires social interaction. Students of TV and

computer software cannot ask questions of the source of the information that is being presented to them. Both require attention to images and thinking in terms of images. Students are required by law to attend school, whereas the viewing of television and the using of a computer are an act of choice. At school, one is required to pay attention to the teacher during a specific time frame. At home, students choose what they will attend to, when, and for how long. If they are watching television they are subjected to a constant barrage of short-term images. If they are using a computer, they can choose to attend for a very short period of time or spend hours on a single task. The student makes the choice. This curriculum is having a profound effect on the way the students of today live and learn.

This change-over has dramatically and irreversibly shifted the content and meaning of public discourse...As the influence of print wanes, the content of politics, religion, education, and anything else that comprises public business must change and be recast in [new] terms....(Postman, 1985, p. 8)

How one learns is the most important thing about learning. In Experience in Education, John Dewey (1902) wrote,

Perhaps the greatest of all pedagogical fallacies is the notion that a person learns only what he is studying at the time. Collateral learning in the way of formation of enduring attitudes...may be and often is more important than the spelling lesson or lesson in geography or history...For these attitudes are fundamentally what count in the future. (p. 48)

If the delivery of the information is presented using a different media, then the message to the learner is not the same.

All subject matter on TV, including educational programs, is entertaining. What is televised is transformed from what it was to a form of entertainment, which has a very different context and meaning from the original source (Postman, 1985). A two second visual snippet of the horror of war shown as part of a 15 second explanation followed by

a ten second snippet of the Queen of England celebrating her birthday, transforms the meaning of war into something that is merely reported and given equal time with the birthday party. Without thinking about it, our mind starts to put equal value on both events based on the importance given them during the news broadcast.

Today, the primary source of education in England and the United States is in the home via television and the computer and is being directed, not by teachers but, by network executives, entertainers, and software designers (Postman, 1985).

Student learning styles continue to change as a result of the influence of TV and computers on lives. Cordova and Lepper (1996) and Kinzie, Sullivan, and Berdel (1998) took this notion and conducted research on how to alter the instructional program to match the new way of learning (Postman, 1985).

Kinzie, Sullivan, and Berdel (1988) in their study of 98 eighth-grade students found that when students were given limited control over a selected aspect of their instruction they were able to adjust their study behaviors appropriately and achieve greater learning in the same amount of time as the students in the control group who were not given such choices. Kinzie et al (1988) pointed out that the elements of learning that can be controlled are the pace, sequencing, difficulty, and amount of practice. In this study, they gave the students control over the amount of practice. Their review of previous literature indicated that an individual's perception of control is an important motivating factor. The Nintendo generation has been schooled at home in controlling what they practice and for how long. The Nintendo game itself is a prime example of this concept.

Using a computer activity designed to teach arithmetical order-of-operations rules, Cordova and Lepper (1996) examined the effects on student learning of three strategies used for increasing students' intrinsic motivation. The three constructs were contextualization, personalization, and the provision of choices. They found that all three produced dramatic increases in the depth of learning, the amount learned in a fixed period of time, perceived competence, levels of aspiration and the intrinsic motivation of the student.

The reason they chose to look at contextualization was that in their view there had been a decline in intrinsic motivation in schools as a result of the decontextualization of instruction. "...teachers often seek quite deliberately to present new material in its most abstract or decontextualized form, presumably in the belief that learning in this abstract form will promote generalization of that learning..." (Cordova & Lepper, 1996, p. 715).

Personalization was the second construct. Characters and objects of inherent interest to the students were added to a standard software package to see if this would affect their motivation. The third area under study was the provision of choice in order to increase the student's sense of control and self-determination (Cordova & Lepper, 1996).

Student achievement was measured along with the affective measures of enjoyment and the effects on task involvement. All areas showed significant increases over the control group. In their concluding remarks they suggested that if gains are to be shown in other contexts using different programs, the important element of consideration must be, "...the match between the actions required for students to learn the material being presented in an activity and the actions required for students to enjoy that activity" (Cordova & Lepper, 1996, p. 727). This study reinforces Postman's contention about the

entertainment factor. As students become more use to the entertainment value of computers, the more they expect other forms of their education (i.e. schooling) to be entertaining as well. It even goes beyond expectations. The culture of the Nintendo generation of students is grounded in the culture of television and computers. This impact on student learning styles is being felt not only in the United States but around the world.

Kamppinen (1998) points out that the spread of information and communication technology is having an effect on the cognitive content of different cultures. Depending on the primary constructs of the culture, the effect and implications are different. The youth around the world are being affected by these changes because they are no longer steeped in the traditions of the industrial era culture.

"I hold that the space of electronically mediated communication will soon become a primary social institution around which our economic, political and social theories will revolve" (Brothers, 1999, p. 22). Brothers discusses the transformation that is occurring between the ideals and theories which governed society based on the nation-state and those which are emerging as we move in cyberspace. "For the past two centuries, the nation-state has comprised the theoretical focal point for social theories of political and moral well-being. ...Cyberspace is threatening the legitimacy of the nation-state..." (Brothers, p. 24). He points out the assumptions of the nation-state included a rather homogeneous population with normative thought patterns and an identifiable social, economic, and political system. As we move into cyberspace, this foundation is being uprooted. With no territorial boundaries comes the question of how people define their duty boundaries. As the power of the nation-state becomes less, there is a concomitant rise in individual power. The implication is a paradigm shift in our primary social

institutions, which is having a profound effect on the Nintendo generation. The Information Age is impacting the culture, which in turn is affecting how students learn, and concomitantly the change in cultural constructs is affecting schools and teachers who work within.

Social Issues

Technology-enhanced learning environments and computer-mediated communication are changing the patterns of how people interact. As the interaction patterns change, so do the social structures. The implications and issues surrounding courses utilizing computers in the classroom and for computer-mediated communication are currently a very hot topic (Brody, 1996; Fanderclai, 1995; Shapiro, Roskos, & Cartwright, 1995; Xu, 1997). Technology-enhanced learning environments and on-line activity are changing communication patterns. This in turn is causing a shift in traditional relationships by altering the choices available, opportunities for interaction, and shifting the power base, all of which cause a change in the social structure.

Technology-enhanced learning environments are characterized by using computers to stimulate and simulate activities that promote student-faculty interaction. Classroom environments can be designed to replace traditional seating with electronic teaching stations and teamwork pods with a computer being the center of the pod. Student response systems can allow all students to respond simultaneously thus increasing active participation. Open laboratories allow students to work on assignments outside of the classroom environment. Direct connections to school computing networks from labs or from the student's home change the learning environment. The classroom can be accessed 24-hours a day from multiple sites. Distance education can be used to

replicate traditional synchronous instruction or for asynchronous computer-based distance learning (Shapiro, Roskos, & Cartwright, 1995).

Xu (1997) points out in his paper, "Advantages and Disadvantages of Using E-Mail as Instructional Aid" that e-mail has greatly increased communication between students and teachers. He believes that e-mail has helped to facilitate fuller participation by students in instructional activities. Computer-mediated communication promotes collaboration and project work, increases equity of participation, and helps to overcome social isolation. Students are actively involved and the experience of all participants is maximized. The use of computer-mediated communication also promotes learner control. Xu (1997) says that "...students...enjoy greater flexibility in terms of time and place in participating in discussions, building on others' ideas, and making better contributions to discussions" (p. 1). On the other hand, students who find writing difficult will find the use of e-mail a daunting task. Xu goes on to say that, "The difficulties involved in putting across what one thinks in writing would also inhibit the student from active participation" (p. 1). Cost and access are also barriers to some students. Changing the communication patterns of people has an effect on social discourse. This discourse is not confined to the classroom but permeates the every day lives of students and teachers.

Multi-user domains (MUDs) are currently being used for real time discussion and collaboration. The immediacy of the exchange and interaction of geographically distant participants is providing an appealing format for educators and students. One of the spin-offs of these new collaborations is that the boundary between teachers and students is starting to blur. Students, as previously disenfranchised members of the school community, can now find an audience for their thoughts and ideas. Fanderclai (1995)

finds the idea intriguing that, "...MUDs could disrupt the hierarchy of the traditional classroom, giving students more power and responsibility and a chance to learn to use them wisely in order to accomplish their goals" (p. 8). Students and teachers who use a MUD as an alternative learning environment are finding new ways to think and interact. Teachers who use the MUD as merely an extension of their current classroom are finding that their objectives can be more easily accomplished and in a more timely manner without going to the bother of using the MUD. The true potential of the MUD is not realized and the teachers and students become disillusioned and frustrated.

Fanderclai (1995) points out the, "...reasons for these conditions are rooted in traditional notions of what education is and is not" (p. 10). Schools are forced into creating the image of what represents a "real" class and to institute programming that provides for a measure of social control. Changing from this mind-set is difficult for individual teachers as well as for schools. Schools exist in a community with a preconceived idea of what education should look like. A MUD to a traditionalist would look like a free-for-all with no accountability. To a constructivist in the Information Age it would look like an opportunity for creative thought, self-directed learning, and an opportunity for students to learn from the ideas of others. For a constructivist, control is replaced by structure. The teacher's job would be to help the student set clear goals and to give the student the tools and methods they need to accomplish their goals.

Brody (1996) looked at computer-mediated communication and its impact on the social structure of the scientific community. He believes that the Internet has provided a medium whereby we will see a shift in global consciousness. When geographical boundaries are lifted by communication over the Internet, people who would not meet or

collaborate in person are readily exchanging ideas. Relationships established at professional meetings can be sustained by electronic communication. Computer-mediated communication fosters small-scale collaboration and has been responsible for large-group projects, which have never been possible before.

In professional ranks, a person's ability to publish in journals that have a peer review component establishes her rank within her discipline. The advent of Web based journals without specific "experts" reviewing articles but merely professionals in the field at large, has changed the power structure of virtually every profession. Journals have become archives of professional information and an inefficient way to disseminate information. Web based publishing makes the distribution of knowledge more democratic and decentralizes the control of publishing (Brody, 1996). Based on the studies cited above, computer-mediated communication is changing the way that people interact. As the interaction patterns change, so do the social structures that connect them. This is true in the community at large as well as within the schools. These studies have been conducted from the perspective of examining the interaction patterns of people, not by asking the teachers in the school what this looks like from their perspective. Although significant research has been done in the area of social issues related to the injection of technology, there remains a knowledge void related to teachers' perspectives.

Organizational Issues

Current research addresses a myriad of organizational issues that have arisen as a result of changing priorities caused by the financial impact in introducing information technology into schools. Budgetary priorities are changing which in turn impact the educational process (Dertouzos, 1998). Administrative techniques have been explored

and suggestions made about how to cope with this new wave. Politically, the gap between the schools that have computers and those that do not is becoming a quagmire (McConnaughey & Lader, 1997). Physical alterations are having to be made to schools, and research into the best designs and how to plan buildings to meet the future technological needs are almost out of date before they can be published. The operation of the schools, including the use of technology, is being looked into from a variety of perspectives (Dertouzos, 1998; Kearsley, Lynch, & Wizer, 1998; McConnaughey & Lader, 1997; Morton, 1996; Young & Smith, 1996).

"Falling Through the Net II: New Data on the Digital Divide" (McConnaughey & Lader, 1997) is a comparative analysis compiled from the U.S. Census bureau in 1994 and then again in 1997. The 1997 data show that Americans have embraced the Information Age through electronic access in their homes. "...PC ownership has increased 51.9%, modem ownership has grown 139.1%, and e-mail access has expanded by 397.1%" (McConnaughey & Lader, 1997, p. 2). Despite this overall increase, ownership and usage is occurring to a great extent within high-income levels, whites, and specific geographic areas. People in rural, urban and central city locations trail the national average and show little change since 1994. White households are more than twice as likely (40.8%) to own a computer than black (19.3%) or Hispanic (19.4%) households. This divide is apparent across all income levels..."(McConnaughey & Lader, 1997, p. 3). This divide between the haves and have nots has increased between 1994 and 1997.

Another factor affecting ownership and use of computers is level of education. People with a college degree are ten times more likely to own a computer as those

without a high school degree. "Most striking are the differences in on-line access among those with a college degree (38.4%), those with a high school diploma (9.6%), and those without any high school education (1.8%)" (McConnaughey & Lader, 1997, p. 4). The people who could probably benefit most from the use of a computer are those who do not have electronic access to find jobs, housing, or other services.

The figures from the "Falling Through the Net II" report parallel the report on the "The Social Context of Education" (Young & Smith, 1996). This report reviewed the associations between student-level social factors and the different indicators of educational access and progress. The report also examined human and financial resources available to high and low income schools. According to the report, if administrators are to provide equal educational opportunity for students they must be aware of the changes that are taking place in the social make-up of the students, as well as the climate and resources available to the school.

According to the Young and Smith report, there is a strong correlation between the parents' educational level and student achievement. The higher the education levels the higher the achievement. As noted above, homes with college educated parents also have computers and access to the Internet.

The percentage of students from a minority background is projected to rise significantly in the first two decades of the 21st century. As noted in the net report, ownership of computers by minority families lags significantly behind whites at all income levels. In 1995, African-American and Hispanic children were more than twice as likely as other children to live in poverty. In the United States, 20.4% of children under the age of 17 lived in poverty. In the United Kingdom, only 7.4% of children lived below

the poverty line. In both countries, minority students are more likely to attend schools with high poverty levels than white students. In the United Kingdom, students of color are far more likely to attend publicly funded schools than are their white counterparts who are disproportionately represented in privately funded schools. The differences in climate and distribution of resources between high and low-income schools have a disproportionate impact on minorities. Schools with a high level of students in poverty have fewer computer resources and are less likely to be connected to the Internet than schools with lower levels of student poverty (McConnaughey & Lader, 1997). The reason for this discrepancy in the number of computers is the disparity in resources available to high poverty area schools. High poverty schools are worse off than low poverty schools with regard to human and financial resources. The level of information technology infrastructure is directly related to the resources available in the school.

Politicians around the world are advocating the use of computers in schools (Dertouzos, 1998). Schools are being pressured by governments in the United States and England to acquire computers and the infrastructure to support them at the expense of other educational programs (Young & Smith, 1996). Both the President of the United States and the Prime Minister of Great Britain are pressing for computer connectivity for all schools. The compounding problem is the significant disparity between the richest and the poorest schools. According to Young and Smith (1996) the richest schools in the United States spent 56% more per student than the poorest schools in 1989-1990.

Once the computers are in place, the administrator faces the obstacle of how to change the use of computers from a tool, on the same level as paper and pencils, to a learning and productivity aide. "While the real world uses computers to move forward,

schools often use them in a misguided effort to support 19th century practices (Morton, 1996, p.416). When computers are seen as tools, they become expensive alternatives to things we already use. This raises a budgetary and planning issue. When financial problems arise, it is easy to look at the expensive tool as a way to cut costs.

Courses using computers are becoming more common (Kearsley, Lynch, & Wizer, 1998). The literature indicates the concerns related to this format include student and teacher frustration with hardware and software problems, the additional preparation time needed by teachers, the additional time students need for learning how to use the computer, and the limited writing and communication skills of some students. The use of computers as part of the instructional program raises the issues of how best to organize and run the courses, how to finance the equipment, how individual learning styles interact with computer driven courses, and what the best ways are to integrate the use of computers into the various subject matter areas.

The literature indicates that organizational and administrative issues have been explored and will continue to be of importance because of the profound effect that the computers are having on schools. Computers are at the core of the information revolution because they do not just provide support, they deal with "...the principal currency of knowledge -- information..." (Dertouzos, 1998, p.20) which is causing a fundamental shift in the culture of schooling. In order to really understand this shift in school culture, it is important to understand this situation from the teachers' perspective.

Gender and Technology

Gender and its effect on learning and use of technology by students, teachers, and administrators, continues to be researched. Content specific studies, grade level analysis,

and patterns of use have shown that gender does have an impact on the educational process (Brosnan, 1998; Dorney & Flood, 1997; Kelly, 1991; Lage, 1991; Whitley, 1997).

A 1997 meta-analysis on gender differences in computer attitudes and behavior found that boys and men have higher computer efficacy and have a more positive attitude toward computers than girls and women (Whitley, 1997). The meta-analysis was conducted of 82 studies in the United States. Whitley also found that boys and men continue to have greater experience using computers than girls and women. Trying to understand the underlying reasons for gender differences is an important component of the educational process and staff development.

The attitudes and use of computers in schools by students and teachers as well as interaction patterns in the classroom are also different depending on gender. It does not matter if one is in secondary school or an adult learner; the patterns remain the same. It doesn't matter if the topic is technology or history. Boys and men monopolize the interactional space of lessons. Kelly (1991) examined the differences in linguistic interactions between adult females and males in classrooms. This study was conducted in London, England, in a community school. An analysis of the data indicates that men talked considerably longer than women and took far more turns. Kelly (1991) cautions us that, "We are in danger of allowing our women students to underachieve in the mixed classroom and we are not giving them the opportunity to practice the life skills which will help them in their future careers and in society in general"(p. 143). It is important that administrators and teachers understand this imbalance if we are to find methods of addressing this problem of use and ability to use technology.

Brosnan (1998) points out that males and females perceive technology as a male activity, and they agree that men are better at computing than women. Brosnan's study reveals that females have higher computer anxiety and which lowers computer usage. Lage (1991) argues that schools have a significant impact on the development of gender-related perceptions of technology. Brosnan found that half of the sample of students in the study was introduced to computing by their teacher. "As many teachers are anxious and represent the introducer of the technology, their early role modeling of technology can be predictive of later technological discomfort in their students" (Brosnan, 1998, p. 65). A recommendation based on this study is that teachers should be trained to reduce their own anxiety, and, in so doing, they will reduce the anxiety of their students, particularly the anxiety of female students.

Another recommendation for reducing gender related imbalance in schools is proposed by Dorney and Flood (1997). Establishing an educational community that promotes the expression of knowledge by all its members is a way to break down the institutional socialization factors that put girls and women at a disadvantage. "...it would seem that if teachers are to address the silences in the curriculum and in their profession they may first have to acknowledge the silencing in their own socialization" (p.72). Both Brosnan, and Dorney and Flood come to the conclusion that the teacher is one of the key elements in reducing the effects of gender imbalance in the use of technology. The teacher's views again are raised as an important research perspective that should be explored if the knowledge void is to be filled.

Projections in the 21st Century

Researchers are taking their findings and projecting them on a 21st Century scenario. We are led to believe that society as a whole, including education, is experiencing an upheaval (Mehlinger, 1996). The proliferation of information technology in society and in our schools is rapidly changing what is happening in classrooms (Irving, 1999). The projected role of the teacher in the 21st century is different (Irving, 1998). The time frame in which we expect major changes to occur is being compressed.

In his address at the Mississippi educational technology luncheon in January of 1999, Larry Irving, Assistant Secretary for Communication and Information in the U.S. Department of Commerce, outlined the impact of technology on the culture of people around the world. Online shopping is rapidly increasing, thus changing the way we invest in goods. Distance education courses are allowing people in remote locations to take classes and tailor them to unique schedules. A significant percentage of jobs now require computer literacy. Information technology jobs continue to increase in number to the point where many of the positions are unfilled because of lack of properly trained workers. Irving points out that the fate of our country depends on the ability of schools to train students in information technology. He also sees the schools as an equalizer between the haves and have-nots. "...we should be focusing on the inclusion of all students in technological training--especially girls and minorities who are underrepresented in the high-tech fields" (p. 4). Irving goes on to say that, "...I want to stress the importance about thinking "outside the classroom" (p. 5). The proliferation of computers is having an impact on our culture and concomitantly on the education system. The two will go hand-in-hand into the 21st century.

In a December, 1998 address titled "Barriers to Implementation of the New Media Landscape", Irving explained that in order to promote growth, new technology must transcend national boundaries. A discussion of barriers brings up the issue of public policy models with shared objectives between numerous countries. The view of the world in the 21st century will no longer originate from the perception of the nation state. Vice President Gore is promoting the Digital Declaration of Interdependence (DDI) for the next millennium. The five challenges of the DDI include:

1. Improving access to technology so everyone has access to data telecommunication services.
2. Developing real-time translation capabilities so people of all languages can talk to each other.
3. Creating a global knowledge network.
4. Using communication technology to promote democratic ideals.
5. Expanding economic opportunities to all people and communities around the world.

"As we grapple with issues that shape the new media landscape, we must also remember why we are discussing these topics--so that more people can benefit from the bounty that our scientists and engineers are creating" (Irving, p. 6). The future cannot be predicted, but we do know that it will continue to be shaped by the infusion of information technology into the culture. It is changing in ways that we take for granted and hardly notice, creeping into every facet of our lives. Schools will be unable to resist the impact of this new technology

Information technology is changing the relationship between students and teachers because it is changing the source of knowledge. Most of the research on technology use has been based on specific interventions that focus on short-term results. According to Mehlinger (1996), we need to look over time at what happens to both students and teachers when they are immersed in technology. We can expect more integration and interaction with the technology as we enter the 21st century, and with it will come change within the educational setting.

If you believe that schools are a part of [a countries] culture, that ... culture is increasingly influenced by Information Age technology, and that teachers participate in the ... culture ..., then you cannot also believe that teachers will use the technology outside of school but fail to employ it in their classrooms. Technology will be used extensively in schools. That much is inevitable. (Mehlinger, 1996, p. 407)

Technology integration in our future will cause a change in the concept of "basic skills". Spelling, computation, cursive writing, historical facts and dates, and other low-level cognitive skills are becoming only marginally useful.

The basic skills of the future will include the use of powerful technologies--computers, video cameras, computerized instruments and tools, image scanners, video digitizers, layout and production programs, multimedia authoring tools, image manipulation programs, and a host of other "tools" that magnify human potential. (Van Horn, 1994, p. 337)

The rapid development of technologies will cause a change in the way we have viewed formal education. Education will need to be life-long in order to keep up the innovations and technological changes which will impact every profession (Rainey & Staples, 1995).

Technology and it's Affect on Learning

The effects of technology on learning have been explored from multiple perspectives. The use of drill-and-practice applications, games and simulations, inquiry

and problem solving software, graphics, word processing, and writing are a few examples of the multiplicity of computer applications in the learning environment. Evaluation of the effectiveness and efficiency of computer technology is an ongoing process in which the focus and methodologies used are constantly changing.

To the general public, achievement scores are an important indicator of the effectiveness of instruction. However, when the use of technology is tied to student achievement, the verdict is still out. Although computers have been billed as making education better and more efficient, this has not come to fruition (Berson, 1996; Cuthell, 1998; Khalili, & Shashaani, 1994; Schmitt & Slonaker, 1996). The perpetual modification of goals and expectations for the use of technology make the analysis difficult (Berson, 1996).

A 1996 examination by the San Jose Mercury News of scores on the California Learning Assessment System (CLAS) test at multiple grade levels at 227 schools in California, showed no strong link between the presence of technology, or the use of technology in teaching, and superior achievement. Three major subject areas were examined: reading, writing and math. The only exception was in schools with a high population of low-income students. In these schools, there was a high correlation between increased achievement and the use of technology. A second finding was that having technology and making technology part of the daily school routine did not increase the achievement scores of the students. The study also found that only about one-third of teachers who had received computer training had become regular technology users. (Schmitt & Slonaker, 1996) When the results of this study are examined in light of John Cuthell's (1998) study of what teachers think about information technology, the results

take on a new light. When teachers were asked what they thought the main impact of computers had on students' work, their overwhelming response was "presentation". Achievement tests do not measure presentation skills; they measure knowledge of the content.

Khalili and Shashaani (1994) conducted a meta-analysis of 36 independent studies published between 1988 and 1992 on the effectiveness of computer applications. They found that computer applications had a positive effect on students' academic achievement from kindergarten to college. The use of computer applications raised examination scores by .38 standard deviation. The size of the effect differed depending on the feature that was being researched. The highest gains were noted when Logo programming language was used, when treatment was applied in a period of one to two months, and when students were selected from high schools.

In a review of nine studies by Khalili and Shashanni (1994) of computer-assisted instruction (CAI) that provided drill and practice in math, language, and the arts in elementary school, they found that the CAI had more positive effects on students' achievement than did traditional instruction when measured by improved scores on standardized tests. The difference between this analysis and the one conducted in California is that the researchers were looking at specific programs with a direct connection to the content tested on the achievement tests.

Berson (1996) examined the literature on the effectiveness of computers in social studies instruction and learning. He found that the inherent difficulty in evaluating the effectiveness was the continuous modification in goals and expectations for the use of technology. Drill-and-practice programs were the most frequently used programs in

social studies, and yet there was a limited research base on the effects of these programs on student achievement. Simulations were evaluated in relation to factual recall, applied learning, and problem solving. When inquiry and problem-solving programs were used in experimental classes, the students demonstrated increased academic achievement, motivation, self-directed learning, self-initiated activity, construction of meaning, analytical analysis, and collaborative peer interaction. The teachers who participated in the experimental classes using inquiry and problem-solving software pointed out that the use of these programs in the classroom would require longer and more intense planning and there would be a need to restructure the learning environment. The use of these programs also significantly reduced the amount of content that could be covered. Berson (1996) points out that:

Despite teachers' expressed desire to increase computer usage in the social studies classroom, integration of software into the curriculum is limited and tends to emphasize the marginalization of computers as an instructional tool that can be transferred into a teacher's existing pedagogical style. Barriers to effective implementation of computers may be associated with the extensive time required for educators to reformat their instructional repertoire to include this technology. (p. 495)

The relationship between student achievement and the use of computer technology is still unclear. Under controlled experimental conditions, there appears to be gains in academic achievement. When teachers attempt to integrate the same computer technology into their classrooms, they find multiple barriers to effective implementation. Teachers' perceptions about instructional technology and the impact on students' work may provide insight into the relationship between student achievement and the use of computer technology.

The research to date has been done from the outside looking into the educational arena. Research has focused on how teachers learn new skills and adapt to change. Staff

training and development have been explored in order to identify best practices. Research has resulted in the identification of barriers to implementation including logistical, organizational, and administrative issues. The "digital divide" has become a focus of research as a result of the concern raised by the disparity in access to resources based on gender, income, and race. There is a propensity for males to have higher computer efficacy and more positive attitudes toward computers, which, in turn, has an effect on education. Student learning styles and their relationship to the paradigm shift that is occurring as the Information Age usurps the Industrial Age have been researched and written about in depth. Social structures have come under scrutiny as interaction and communication patterns change with increased use of computers and the Internet. Research indicates these are having a profound effect on the personal as well as professional lives of educators. All of this research provides futurists the information they need to make projections for education in the 21st century. What continues to be missing is the perspective of the classroom teacher as this change process unfolds.

Life in Schools

"In a fundamental sense, school is school, no matter where it happens" (Jackson, 1968, p. 7). There are physical structures and constructs that transcend schools whether they are in England or the United States. Similarities between English and American schools include:

1. Students are required to attend schools from the age of 4 or 5 to about 16.
2. Students progress through a series of grades, each one school year in length.
3. Each grade is age related.

4. During the first five or six years students generally have one primary teacher.
5. When students progress to the secondary form of education, they have subject area specialist who provides instruction in a variety of compulsory and elective courses.
6. Students are evaluated on their progress throughout their educational career.
7. School buildings contain a number of cell-like structures called classrooms in which a teacher conducts the lesson.
8. Each school has an administrator.
9. Each school has a school board or board of governors selected from the community to oversee the school.
10. Money for schools comes from taxes or, in the case of independent schools, from private sources.
11. Schools have a curriculum.

Schools in the United States and England have similar physical structures and basic operating procedures. A student would have little difficulty moving between schools within each country or between schools in the two different countries.

The foundation of the current system of education in the United States and England is the Industrial Era model. According to Jackson (1968), the role of students is to learn how to function within the institution called school that fosters the behaviors of the world of work, (i.e. listening, following directions, taking turns, complying with authority, being on time and maintaining an orderly work environment.) Tyack and

Cuban (1995) support this observation that schools were created to mirror the world of work and are designed based on the theories of scientific management. Schools offer a stable environment and predictable physical arrangement. According to Tyack and Cuban (1995),

The basic grammar of schooling, like the shape of classrooms, has remained remarkably stable over the decades. Little has changed in the ways that schools divide time and space, classify students and allocate them to classrooms, [and] splinter knowledge into 'subjects'. (p. 85)

Schools of today are predictable institutions that grew from an Industrial Era model. They are compulsory, follow a routine, and are repetitive (Jackson, 1968). Just as in other workplaces, the structure and constructs of schooling influence how teachers teach and think about work. Dewey (1904) points out that the manner in which the machinery of instruction bears upon the child affects the whole system (p. 22-23). The structure of the workplace called school has a profound influence on what is expected of teachers and how they carry out their job.

In the classroom, the teacher is the boss and the official timekeeper. Classrooms are basically evaluative settings, and teachers are the chief evaluators. Teachers retain a degree of autonomy once the classroom door is closed. However, teachers are strongly influenced by the public belief in what a "real" school looks like, that pedagogy can be prescribed, and the products of learning can be measured and summarized for scrutiny (Johnson, 1990).

Schools are institutions within communities and cultures. Even though there may be a significant difference between various communities, a "grammar of schooling" still pervades (Tyack & Cuban, 1995). The grammar of schooling provides a standardized

way to process large groups of students. It is easily replicable so students will encounter the same basic institution regardless of where they live.

Schools in England and the United States follow a curriculum regardless of whether a country, a state, or a school board of governors mandates it. Although this exerts a strong influence on teachers, Johnson (1990) has found that they still control how and what they teach. Curriculum objectives can be accomplished using a variety of strategies, and good teachers attend to both the learning needs of the students and to their own interests. These interests can be content-related or apply to an interest such as the use of technology in the classroom.

Johnson (1990) examined the context of teaching as experienced by teachers. The sample consisted of 115 teachers including 75 from public schools, 20 from independent schools, and 20 from church-related schools. Interviews focused on how the teachers' perspectives, values, and insights were similar. Johnson explored with the teachers the relationships among colleagues, students, and administrators; the influence of the governing structure; the cultural norms and traditions; the opportunities for learning and growing; and the role of pay and incentives. As in other professions, Johnson found that the workplace profoundly affects the work that is done by teachers.

Johnson (1990) found that teachers within a particular school share an expectation of how things are done at that school. This culture is then passed on to new teachers, and by doing so, a stable work situation is created. Teachers jealously guard their autonomy to run their own classroom, but they must do so within the culture and traditions of the schools. Traditions take precedence over new innovations.

Another major finding by Johnson (1990), was that teachers' learning and growth is a personal rather than an institutional responsibility. In-service programs conducted two or three times a year are designed and carried out by the administration to primarily meet the administrative needs of the school. Faculty meetings are too short to be a productive platform for learning. The supervision system does not encourage teachers to be learners. Learning new skills that will allow teachers to use new technologies, will probably not be accomplished effectively through the in-service program. If teachers wish to learn how to integrate and change their instructional program and to take advantage of new technologies, they must do so on their own time and use their own resources.

McLaren (1989) looks at the social constructs of education. As a result of his teaching experience and critical analysis, he became aware of the power of the social tradition of schools in shaping how teachers teach and how students are molded to follow the patterns which have been established by the dominate culture. His thesis is that the only way the pattern can be changed is by teachers taking a critical look at how they teach and changing these outmoded strategies and replacing them with "...schools as sites of possibility, in which classrooms provide conditions for student empowerment" (p.238).

In looking at the issue of technology, McLaren (1989) saw that teacher use of new technologies can be used to perpetuate the Industrial Era model of teaching, or new technologies could be used as a means to change the power structure in the educational setting. Strong traditions and the grammar of schooling act as barriers to this transformation and affect teachers' choices in how they teach.

Life in schools today is grounded in structures and constructs born out of the Industrial Era. Even though teachers retain a degree of autonomy once the classroom door is closed, they are still strongly influenced by the traditions of the grammar of schooling. The grammar of schooling transcends communities and countries which results in schools being very similar. The structure of the workplace called school dictates how and what teachers teach. The workplace structure is also a barrier to the teachers' own learning and growth which further impedes change in the culture of traditional schooling. New technologies are being injected into the workplace. Teacher beliefs and the structure of the workplace will continue to play a key role in what and how teachers teach.

Change

This research is not specifically about change. However, the introduction of information technology is linked to the concept of change. The purpose of this review on change is to make the reader aware of the issues.

Since 1988, there have been several educational changes in England that have had a significant impact on local schools. The introduction of information technology, assessment of teacher competencies, increase of class time devoted to basic math and literacy, plus raising standards for and expectations from students are what Sarason (1996) calls Type B changes. They are not intended to be systemic ones. Each is intended to change and improve something, but that something is not the school or the system. In order to understand any single component in the context of change, it should be addressed as part of the whole in its interrelationships within a complex system.

According to Sarason, it is important to understand that, "The general public, no less than educators, ha[s] been socialized to accept the [education] system as it has been and is. The values and axioms undergirding the culture of our schools are those of the larger society" (Sarason, 1996, p. 381). The introduction of computers is not a trivial matter because it requires changes in attitudes and custom. The process of implementation confronts features of the school culture that are obstacles to change such as the primacy of the General Certificate of Secondary Education (GCSE) grades in England.

Hargreaves (1994) points out that it is important to examine the changes taking place outside the school in order to understand the changes within. "In England and Wales, policymakers tend to treat teachers rather like naughty children, in need of firm guidelines, strict requirements and a few short, sharp evaluative shocks to keep them up to the mark" (Hargreaves, 1994, p. 14). Changes that have taken place in England in a very short period of time that have affected teachers' decisions include the introduction of the national curriculum, compulsory performance appraisal to regulate teachers' methods and standards, and the shift to local management of schools in order to make them more responsive to market forces. Local management of schools is not proving beneficial because funding is scarce and bureaucratic control over curriculum and assessment has been retained at the national level. This has led to narrowly defined goals of basic skills and academic success. According to Hargreaves, school based management has not led to devolution of decision-making but to displacement of blame.

The British case of multiple, mandated change is perhaps an extreme one. It is extreme in its frantic pace, in the immense scope of its influence, and in the wide sweep of its legislative power.... In the United States, educational policy at the

federal level has little legislative force and is mostly expressed through public documents and debates. (Hargreaves, 1994, p. 6)

The change in the UK has been top-down with little respect being shown for teachers' abilities and without including them in the process. Teachers who are key to educational change are being caught in the crosscurrents. For change to occur successfully, teachers must be involved in the decisions and the injection of information technology into the educational setting. (Hargreaves, 1994)

The mandate and expectations from the national level are not enough to ensure that a change in the use of IT will occur. Political and administrative devices dictate the educational change and ignore or override the teachers' own beliefs and desires for change. The motives of the national government are relying on principles of compulsion to affect change.

According to Hargreaves (1994), seven maxims can be gleaned from the research on the change process.

1. Change is a process not an event.
2. Practice changes before beliefs when change is imposed.
3. It is better to think big, but start small.
4. Evolutionary planning works better than linear planning.
5. Policy cannot mandate what matters.
6. Implementation strategies that integrate bottom-up strategies with top down ones are more effective than top-down or bottom-up ones alone.
7. Conflict is a necessary part of change.

When a change is anticipated, such as the introduction of information technology, the seven maxims should be taken into consideration when trying to understand the process of change in relation to the issue.

Fullan (1991) points out that, "The anxieties of uncertainty and the joys of mastery are central to the subjective meaning of educational change and to success or failure--facts that have to be recognized or appreciated in attempts [to introduce information technology]" (p. 32). When change is dictated from above, there are few reasons for the teacher to believe in that change and few incentives to find out whether it will turn out to be worthwhile. As House (1974) explains,

The personal costs of trying new innovations are often high...and seldom is there any indication that innovations are worth the investment. Innovations are acts of faith. They require that one believe that they will ultimately bear fruit and be worth the personal investment, often without the hope of an immediate return. Costs are also high. The amount of energy and time required to learn the new skills or roles associated with the new innovations is a useful index to the magnitude of resistance. (p. 73)

Initially, teachers are more concerned with how the change will affect them personally in terms of what they will have to learn, how much time it will take to learn the new skills, and if it will help them meet their teaching objectives. The introduction of information technology has been mandated at the national level and appears not to have taken the subjective reality of the teachers into account.

Fullan (1991) explains that educational innovation is a multidimensional process involving at least three components. These must be woven together in order to make change successful. The components are:

1. The possible need to use new materials or to revise current materials.
2. The possible need to use new teaching strategies or activities.

3. The possible need to alter pedagogical assumption and theories underlying the inclusion of computers as part of the instructional program.

Lortie (1975) describes teacher ethos as conservative, individualistic, and focused on the present. The profession is steeped in the traditions of what a "real school" is (Tyack & Cuban, 1995). The teachers' identity is centered around what they have learned about the profession from being students themselves, the community image of education, plus their cumulative experience as classroom teachers. They see that change associated with the introduction of information technology may invalidate this experience, robbing them of the skills they have learned and confusing their purposes. Changes in beliefs required to implement information technology may challenge the core values of individual teachers regarding the purposes of education.

Beliefs guide and are informed by teaching strategies and activities; the effective use of materials depends on their articulation with beliefs and teaching approaches and so on. Many innovations entail changes in some aspects of educational beliefs, teaching behavior, use of materials, and more. Whether or not people develop meaning in relations to all three aspects is fundamentally the problem. (Fullan, 1991, p. 41)

To further exacerbate this process, teachers themselves may not understand or be able to articulate their beliefs because they are buried in traditions of education that have surrounded them all of their lives.

Fullan (1991) suggests that the solution to the problem is for the teachers to come to a clear understanding about the educational practices associated with information technology. They must be clear on both the content and theory. The teachers must be clear on the desirability and workability of the proposed practices. In other words, teachers, "have to understand both the change and the change process" (Fullan, 1991, p. 46).

Summary

Chapter II has provided a review of the literature on: (1) teachers' beliefs, (2) studies and research related to the use of technology in schools, (3) life in schools based on the Industrial Era model, and (4) the process of change. The first section examined the concept of teachers' beliefs and the tie to instructional practice and decision making. The second section on the studies and research related to the use of technology in schools established that there is a knowledge void of what is actually happening in the classroom from the perspective of the teacher. Sociocultural conditions of schools as workplaces based on an Industrial Era model were described in the third section on life in schools. The introduction of information technology as part of the change process was examined in the final section. Chapter III will present the design for the inquiry.

CHAPTER III

INQUIRY DESIGN

Chapter III presents the rationale for the design of this study and the methodology that guides it. An overview of the British educational system is presented. A discussion of the selection of respondents and site, data collection methods, and data analysis are included. An explanation of efforts to ensure that trustworthiness and consistency are discussed as part of the methodology.

The British Education System

In Great Britain there are 34,041 state schools with .54 million children in private schools and 8.5 million in state schools. Schools receive their funding from money dispensed for education through other bodies such as local education authorities, which are the equivalent of a school board in the United States. In England, most schools are funded by their local education authority, which has oversight responsibilities within a city, town, or catchment area (The British Council, 1999).

Local education authority (LEA) schools maintain their own budgets and allocate funds to schools based on a formula that is largely driven by student enrollment. Each LEA has a governing body made up of appointed governors, elected teacher and parent governors, and people from the local community. The governing body, school board, is responsible for overseeing spending, for developing school policy, and for staffing (The British Council, 1999).

In England compulsory education takes place between the ages of five and sixteen although many students stay on beyond the minimum age. As in the United States, the

parents of student are responsible for seeing that their children attend school. The usual age for a student to move into secondary education is eleven, and no form of examination or grades is required. Entrance to independent secondary schools, however, is by way of a common entrance examination taken at the ages of 11, 12, or 13 (The British Council, 1999).

In 1988, a national curriculum was introduced in England and Wales which outlines what students should study, what they should be taught, and what standards they should achieve. A threefold system of assessment is used: one to monitor student performance, one to evaluate the school, and one to evaluate the system. The Standard Assessment Tasks (SATs) examination is given to students at ages 7 and 11 to determine their level of achievement against national standards (Leonard, 1988).

About 90% of state secondary school students in England go to comprehensive schools, which provide a wide variety of courses for students. At age 16, students may transfer to a sixth form college or tertiary college. Students between the ages of 14 and 16 must study the core subjects (English, math, science), technology, a modern foreign language, and physical education, plus either history or geography (The British Council, 1999).

The General Certificate of Secondary Education (GCSE) exam is taken by secondary school students at age 16. The GCE A-level and AS-level tests are taken at around 18 years of age. The GCSE is a single-subject examination that emphasizes coursework, examination, and application of knowledge. School-based assessment of course work by teachers forms a significant percentage of the final result. A-level examinations are usually taken after two further years of education beyond the GCSE.

These two years are known as the sixth form. Students specialize in two or three related subjects and are then tested specifically on those subjects. AS-level courses are designed to broaden sixth-form studies beyond the traditional clusters of science and arts subjects. AS-levels are designed to occupy half the teaching and study time of an A-level, but are set to the same standard and are taught as two-year courses. Two AS-levels are the equivalent of one A-level (The British Council, 1999).

The General National Vocational Qualifications (GNVQs) program offers students over the age of 16 with an alternative to the academic program prescribed for students studying for an A-level or AS-level. The GNVQs provides a broad base of vocationally relevant knowledge and skills in preparation for entry into the world of work or for progression to higher education. Subjects include art and design, health and social care, leisure and tourism, manufacturing, construction, hospitality and catering, and science. A student may take a full GNVQ or pair it with other qualifications such as a GCE A-level, AS courses, or a couple of GCSEs. All GNVQs have compulsory core classes that must be taken regardless of the vocational area being studied. They include communication, application of numbers, information technology, personal skills, and problem solving (The British Council, 1999).

The Office of Standards in Education (OFSTED) is a non-government department that inspects all state schools and reports on the quality of the education provided as well as the educational standards achieved by them. Just as American schools are evaluated by a non-governmental accreditation agency, so, too, are the English schools. Each school is evaluated every four years. The evaluation team consists of a registered inspector as the team leader, professional members such as subject area specialists, and at least one

member who has no professional experience in teaching or managing a school. Once the inspection is completed, a report is sent to the school and to OFSTED. This report is then made public. The school responds to the report by developing an action plan to address any deficiencies (The British Council, 1999).

Rationale for the Method

Qualitative research is based on the view that reality is constructed by the individuals interacting with a particular social context. "It describe[s] in depth how things [are] at a particular place at a particular time" (Stake, 1995, p. 38). The qualitative researcher is, "...interested in understanding the meaning people have constructed, that is, how they make sense of their world and the experiences they have in the world" (Merriam, 1998, p. 6). "Qualitative researchers...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). Understanding the phenomenon of interest is from the participant's perspective.

Symbolic interactionism is the theoretical school of thought that, "...links [the] construction of meaning to the role that individuals and social structures play in creating meaning" (deMarrais & LeCompte, 1999, p. 22). Meaning-making is grounded in the symbols--words, gestures, artifacts, or concepts that stand for something else.

"...Meaning is made by individuals. But society itself also is created by the meanings they make" (deMarrais & LeCompte, 1999, p. 22). Symbolic interactionists believe that meaning and social interaction are linked. In this vein, symbolic interactionists believe: (1) the data is derived from examining interactions, (2) the key to understanding

someone's role is using empathy and perspective, and (3) the definitions that people give to a particular situation determine the actions and the meaning of those actions (Berg, 1989).

Three major paradigms underlie educational research. Education or schooling is considered to be the object or process to be studied in positivist based research. To a positivist, there is one reality that is observable and measurable. Knowledge that is gained through scientific enquiry is objective and quantifiable (deMarrais & LeCompte, 1999). The second paradigm is critical research. Education in this context is a social institution designed for social and cultural transmission. Knowledge is an ideological critique of oppression, power, and privilege in areas of educational practice. As a critical researcher, "...you would be interested in how the social institution of school is structured such that the interests of some members and classes of society are preserved and perpetuated at the expense of others" (Merriam, 1998, p. 5). By contrast, a third paradigm naturalistic inquiry assumes that multiple realities exist. Naturalistic inquiry suggest "...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 events in their natural setting and reports on them through descriptive and interpretive language.

The nature of the problem and the design of the study drive the selection of the strategies used to investigate the issues. The literature review reveals that numerous studies have addressed a myriad of issues relating to computer use in the classroom. Many of the studies have been done from the point of view of the researcher examining

an issue as an isolated construct. These studies have explained some of the issues related to the use of information technology in the classroom. In this study, teachers' instructional decisions involving information technology will be described and analyzed. The teachers' perspective will help to place the pieces of the jig-saw puzzle of various explanatory pieces of research into the frame of reference of the teacher. This study from the teachers' perspective is best served through naturalistic inquiry.

Naturalistic inquiry, which focuses on meaning in context, requires a data collection instrument sensitive to underlying meaning when gathering and interpreting data. Humans are best-suited for this task--and best when using methods that make use of human sensibilities such as interviewing, observing, and analyzing. Nonprobability forms of sampling and inductive data analysis are consistent with the goals and assumptions of this paradigm.... (Merriam, 1988, p.3)

Case study is one type of naturalistic design. According to Yin (1989), a case study is an "...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" (p. 23). The focus of this study is the examination of the teachers' perceptions based on their beliefs, related to their decisions concerning the use of information technology. The issues are intricately woven into the social, historical, and political fabric of British education, the school, and the classroom in particular. The personal contexts of the teachers will be central to the understanding of the issues. Stake (1994) explains the nature of the research question by comparing two concepts. Explaining a phenomenon is different from wanting to understand it. The latter is conducive to a case study approach. The process becomes more important than the outcomes or products.

The decision to use case study is based upon the: (1) nature of the research question, (2) the delimiting object of the study, (3) the control of the investigator, (4) the

desired outcome, and (5) the context and time frame (Merriam, 1998; Yin, 1994). In this study, the research questions are "how" questions (Yin, 1994). The boundedness of the system is indicated by the connections that all of the respondents have to the injection of information technology in their particular school. Through the design, the researcher will have little control over actual behavioral events. The desired end product of this study is a description and interpretation of a particular phenomenon where the process is more important than the product. The setting is a contemporary phenomenon within a real-life context.

Yin (1994) describes three types of case study: (1) explanatory, (2) descriptive, and (3) exploratory. An explanatory case study was chosen because, "The analyst's objective is to pose competing explanations for the same set of events and to indicate how such explanations may apply to other situations" (Yin, 1994, p. 5). The use of this framework allows the researcher to remain sensitive to emerging propositions for further investigation and does not imply a clear set of outcomes.

Selection of the Site

The research design guided the selection of the site for this study. The site is an urban secondary school in England, in a multiethnic neighborhood that draws students from a full range of economic and social levels. Qualitative research is based on the view that reality is constructed by the individuals interacting with a particular social context. Since the main aim of this study was to investigate the decisions regarding the use of information technology from the teachers' perspective, data were obtained from teachers at one school site where they had access to and used information technology.

Respondents, undergoing a common experience at a single site, created a bounded unit. A secondary school was chosen because of my interest in this level of education.

A member of the University Institute of Education faculty was consulted for recommendations based on her experience and knowledge of secondary schools in the area. The head teachers (principals) of several sites in the area were contacted to determine if they would be interested in participating in the study. Several schools turned down the offer because of other research studies being done in their schools at the time since it is a university town with multiple research projects going on all of the time, this factor affected the selection of the site.

Prior to final site selection, school sites were visited and a conference was held with either the head teacher or the staff member in charge of research. The school was chosen based on the level of interest by the head teacher and the head of research, and the determination that the teachers within the school had access to and were using information technology as part of their instructional program. I visited the site and met with the teacher who is assigned the extra duty position of head of research. The site was selected because it possessed characteristics that were determined to be of interest to the study: (1) teachers had access to computers and other forms of information technology, (2) classroom teachers had multiple levels of technological experience, and (3) teachers were using information technology as part of their instructional program.

The selection of the site was determined by: (1) the potential of the site to generate data for answering the research questions, (2) my access to the site, and (3) the willingness and approval of the head teacher to allow me to conduct observations, interviews and to collect artifacts.

Selection of Respondents

The research design and the research questions guided the selection of respondents for this study. The purpose of this study was to understand how teachers make decisions about using information technology in the instructional process. The single site experiencing the same impact of information technology injection into the setting created a bounded unit. Therefore, data were obtained from teachers at one site.

"Purposeful sampling is based on the assumption that the investigator wants to discover, understand, and gain insight and therefore must select a sample from which the most can be learned.... Information-rich cases are those from which one can learn a great deal about issues of central importance to the purpose of the research..." (Merriam, 1998, p. 61). Purposeful sampling requires the researcher to determine a criterion-based list of characteristics that is a direct match with the purpose of the study and the research questions. The second step is to locate respondents who match the criteria. In consultation with the head of research, and based on his observation and knowledge of the staff, the teachers were chosen based on the following criteria: (1) veteran teachers with over five years of teaching experience, (2) technologically advanced teachers and teachers who were just emerging technologically, (3) teachers from a variety of content areas, and (4) teachers who had the time and were willing to participate in the study. Veteran teachers were selected because it was believed they would have established a teaching style and were settled into the culture of schooling. Teachers representing a variety of skill levels in technology were used to open the possibility that skill levels could play a role in the decision making process. The content areas reflected in the respondents included English, geography, history, music, technology, and special needs.

The study required a significant amount of time and interaction with me. The teachers participated in an interview, reviewed rough drafts of writing, allowed me to make observations in their classes, and shared personal and school documents. The respondents agreed to this commitment for the duration of the study. The third step was to determine the size of the sample. "The size of the sample within the case is determined by a number of factors relevant to the study's purpose" (Merriam, 1998, p. 66). A small diverse sample of respondents was used in this study in order to examine important shared patterns that transcend respondents and to see what issues emerged out of their heterogeneity (Merriam, 1998).

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

Data Collection

"The data collection techniques used, as well as the specific information considered to be data in a study, are determined by the researcher's theoretical orientation, by the problem and purpose of the study, and by the sample selected" (Merriam, 1998, p. 70).

"Naturalistic research involves utilizing what one comes into the world with (i.e., the five senses plus intuition) to gather, analyze, and construct reality from data. The primary instrument in this type of research is the researcher..." (Erlandson, Harris,

Skipper, & Allen, 1993, p. 83). I functioned as the primary data collection instrument throughout the course of the study and played different roles including teacher, advocate, observer, interviewer, reader, and analyzer. I was constantly deciding how much emphasis to give each role (Stake, 1995, p. 91). Using the self as the instrument of inquiry requires me to conduct a review of their familiarity with the culture under study.

...deep and long-lived familiarity with the culture under study has potentially, the grave effect of dulling the investigator's powers of observation and analysis. But it also has the advantage of giving the investigator an extraordinarily intimate acquaintance with the object of study. (McCracken, 1988, p. 32)

To this end, I identified and examined personal expectations and assumptions related to this study. My role as an administrator in a school that is undergoing change because of the injection of technology was examined and patterns of interaction and expectations were identified as well as taken into consideration when planning the data collection process. McCracken (1988), 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" (p. 19). I used my life experiences as an aid in establishing categories and matching patterns in the data. Symbolic interactionists believe that perspective and empathy to another's role are key to understanding the meanings that participants ascribe to a situation (deMarrais & LeCompte, 1999, p. 22).

"All research is concerned with producing valid and reliable knowledge in an ethical manner" (Merriam, 1998, p. 198). The applied nature of educational inquiry in which the researcher intervenes in people's lives requires the researcher to establish trustworthiness by conducting the study in an ethical manner. To ensure that reliability and validity issues were addressed, a combination of data collection strategies were used. Multiple methods provided opportunities for patterns to emerge from different sources

and for contradictions to come forth from the data. The use of multiple methods also provided ample descriptive evidence to allow the reader to follow the study and to have confidence in the conduct of the investigation and in the results of the study (Merriam, 1998, p. 199).

Three strategies were used to collect data in this study: (1) direct observation, (2) semi-structured interviews, and (3) review of school artifacts. The amount of time spent in the field was contingent upon the time needed to collect data, the time available for interviewer/participant interaction, and the amount of data available. Three important data collection principles were adhered to including: (1) the multiple sources of evidence, (2) creation of a case study database to ease retrieval and storage, and (3) maintenance of a chain of evidence for increased reliability (Yin, 1989, p. 78).

Observations

Observation, an important tool for collecting data, gave a firsthand account of the phenomenon of interest and the decisions made by the teachers to use information technology. These observations took place in the natural setting instead of a location designated for the purpose of interviewing. Informal interviews and conversations were woven into the observation process (Merriam, 1998, p. 94). Observation as a research tool must: (1) serve a specific research purpose, (2) be deliberately planned, (3) be systematically recorded, (4) be conducted to triangulate emerging findings, and (5) provide some knowledge of the context that can be used as reference points for subsequent interviews (Kidder, 1981; Merriam, 1998).

The research questions and the conceptual frame of the study determined the focus of the observations. Merriam (1998, p. 90) suggests elements present in

observations should include: (1) physical setting, (2) participants, (3) activities and interactions, (4) conversations, (5) subtle factors, and (6) behavior of the researcher. The observations targeted general site characteristics, interaction of teachers and information technology in the classrooms and in the lab setting, teacher use of information technology with/without students, and use of information technology when the teacher was not present.

During the observations, I acted as the observer. Although the observations were not made covertly, my participation in the activities that were taking place at the time of the observation was minimal (Erlandson et al, 1993, p. 97). "...the researcher must be sensitive to the effects one might be having on the situation and account for those effects" (Merriam, 1998, p. 104).

"The process of collecting data through observations can be broken into three stages: entry, data collection, and exit" (Merriam, 1998, p. 98). Entry into the site, the school, was obtained through the director of research and the head teacher. The observation phase of the study took place over a nine-week period of time.

Once the researcher becomes familiar with site it is important that, "...the researcher establish rapport by fitting into the participants' routines, finding some common ground with them, helping out on occasion, being friendly, and showing interest in the activity" (Merriam, 1998, p. 99). Once familiarity was achieved, I had an awareness of what could be observed at the school. Data collection began in order to achieve an understanding of the school culture in three areas: (1) information technology, (2) teaching using information technology, and (3) instructional decision making. Planning and teaching sessions were observed to gain understanding of the decision-

making process. Observational strategies should include: (1) paying attention, (2) focusing on a person, interaction, or activity and at the same time mentally blocking out all others, (3) looking for key words, (4) concentrating on first and last remarks in a conversation, and (5) mentally playing back remarks and scenes during breaks in the talking and observing and immediately after the observation (Taylor and Bogdan, 1984). It is also imperative that full notes be written or typed as soon after the observation as possible. The content of the field notes usually include: (1) verbal descriptions of the setting, people, and activities, (2) direct quotations or the substance of what people said, and (3) comments by the observer (Merriam, 1998, p. 106).

Recorded observations consisted of a combination of on-site notes, full descriptions written or typed immediately after the observation, and added comments. The field notes contained the date, time, participants, location, activities, and observer comments about factual information as well as comments on and thoughts about the setting, people, and activities. "In raising questions about what is observed or speculating as to what it all means, the researcher is actually engaging in some preliminary data analysis. The joint collection and analysis of data is essential in qualitative research" (Merriam, 1998, p. 106). Sketches were made of the physical layout and photographs taken of the environment in which the observations took place.

Since planning for a single lesson often takes place in multiple settings, many of them not at the school, I was unable to observe a complete planning session with any particular individual. However, I was able to observe and talk with teachers as they planned for upcoming lessons. I also spoke to teachers after a lesson involving information technology (IT) to query the planning process that went into the lesson.

Interviews and conversations with teachers allowed me to have knowledge of the decision making process from the teachers' perspective. Inferences were made about individual teacher's decisions based on the IT lesson observed, teacher planning documents, and information provided to me by the teacher.

Observations and interviews have a reciprocal relationship within the research process. The interactive process that joins them becomes one of developing and verifying shared constructions of reality.

Interviews

"Every social scientific study is improved by a clearer understanding of the beliefs and experience of the actors in question" (McCracken, 1988, p. 9). The interview is a means to achieve this objective. The interview is a very important source of data.

Overall, interviews are an essential source of case study evidence because most case studies are about human affairs. These 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, 1994, p. 85)

The interview, "...gives us the opportunity to step into the mind of another person, to see and experience the world as they do themselves" (McCracken, 1988, p. 9). The interview is concerned with cultural categories and shared meanings. Patton (1980), explains this concept by saying:

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. (p. 196)

This study used semi-structured interviews. In this type of interview, there is a mix of structured and unstructured questions which are flexibly worded. The interview is guided by a list of questions or issues to be explored (See Appendix D). "This format allows the researcher to respond to the situation at hand, to the emerging worldview of the respondent, and to the new ideas on the topic" (Merriam, 1998, p. 74). All respondents received the same "grand tour" type questions (McCracken, 1988), but the specific wording and order of questions was subject to the flexibility demanded by the uniqueness of each respondent's perspective. Subsequent questions and probes were determined by the emerging perspective of the respondent (Merriam, 1998).

All interviews were conducted on the school site. Each teacher was interviewed face-to-face for approximately one hour. The interviews were taped and supplemented with interview notes and the recordings were transcribed verbatim.

The questions and prompts were divided into five major categories: (1) beliefs about teaching and learning, (2) perspectives of the teacher on information technology, (3) perspectives on change, (4) decision making with reference to information technology usage as part of the instructional program, and (5) the relationship between beliefs and the use of information technology in the classroom. Prompts consisted of grand tour questions, ideal position questions, conversation cues, and a stimulus in which interviewees were asked to make a preference choice and elaborate on why and how they made their choice. The interview protocol was first piloted and revised with input from teachers, cohort colleagues, and my liaison from university's Department of Education. The interview protocol is found in Appendix D (Merriam, 1998).

Respondents were provided a copy of the transcribed interviews as a form of member check. The respondents were asked to review the transcript, verify its accuracy, and alter the transcript to clarify concepts. A follow-up letter (Appendix E) was sent to respondents, asking for their thoughts before publishing the report and thanking them for their participation in the interview.

Artifacts

Artifacts, broadly defined as public records, personal papers, visual references, and physical material, were collected that contained information and insights relevant to the research questions. Artifact collection and review were selected as a data gathering technique because it is less intrusive than observations and interviews. Because these items were created for reasons other than the research, they contained important pieces of information and were not subject to the same limitations of the observation and interview process. Artifacts can be personal or public documents, symbolic materials, physical objects, and basically "... anything that is in existence before the research at hand" (Merriam, 1998, p. 113). Artifacts included the teachers' planning documents, school policies and procedure documents, school scrapbooks, photographs, newspaper articles, student displays of work, OFSTED evaluation reports, the school prospectus, government publications regarding strategies for the use of IT in schools, and minutes of school-level governor's meetings.

Since many case studies are at the program level, it is particularly important to seek out the paper trail for what it can reveal about the program--things that cannot be observed, things that have taken place before the evaluation began. (Merriam, 1998, p. 114)

The search for and selection of artifacts is guided by the research questions, educated hunches, and emerging findings (Merriam, 1998, p. 120). Merriam points out

that the process of artifact collection must be systematic yet flexible in order to allow the researcher's creative intuitive nature to help in the discovery of valuable data. She states that this process is basically the same as that used in interviews and observations.

Detailed studies of the artifacts were conducted by me in order to explore the relationship between the teachers and their environment in relation to the use of information technology. The conditions under which the artifacts were created was explored in order to understand "...the consequent impact on the nature of the data..." (Merriam, 1998, p. 120). A systematic yet analytic form of content analysis was conducted.

Artifacts are a good source of data because they do not react to a researcher's presence or initiatives and as a result, "...these stable nonhuman sources provide a context for understanding and evaluating the data obtained from dynamic human sources" (Erlandson et al, 1993, p. 101) such as interviews and observations. Artifacts can furnish, "...descriptive information, verify emerging hypotheses, advance new categories and hypotheses, offer historical understanding, [and] track change and development" (Merriam, 1998, p. 126). Artifacts are excellent sources of data because "... they can ground an investigation in the context of the problem being investigated" (Merriam, 1998, p. 126). For this study, the Internet was also used to obtain copies of public documents relating to the school from local as well as national sources.

Exit from the site occurred when there appeared to be a saturation of information obtained from the observations, interviews, and collection of artifacts. Saturation became apparent through the simultaneous collection and analysis of information. When no new information, patterns, and categories were emerging, it was determined that saturation had occurred.

Data Analysis

The collection and analysis of data occur simultaneously throughout the duration of a qualitative study. Qualitative research is an emerging design, dictated by the data, interpretation, and conceptual frame. "The process is recursive and dynamic. Analysis becomes more intensive as the study progresses" (Merriam, 1998, p. 155). Analysis begins when the first data is collected and progresses to ever more sophisticated categorization and interpretation of the information. New data generates or refines analytical categories and techniques. The data analysis can result in revisions in the data collection procedures. In conducting data analysis during data collection, the researcher utilizes some of the same methodological tools that ensure the study's trustworthiness" (Erlandson et al, 1993, p. 115).

Bogdan and Biklen (1992) offer ten suggestions for the researcher to use while collecting and analyzing data.

1. Force yourself to make decisions that narrow the study.
2. Force yourself to make decisions concerning the type of study you want to conduct.
3. Develop analytic questions.
4. Plan data collection sessions according to what you find in previous observations.
5. Write many "observer's comments" as you go.
6. Write memos to yourself about what you are learning.
7. Try out ideas and themes on subjects.
8. Begin exploring literature while your are in the field.

9. Play with metaphors, analogies, and concepts.
10. Use visual devices.

Collecting and analyzing data simultaneously is useful in narrowing the focus of the study by establishing categories of thought based on the emerging thematic units. An evolving framework for analyzing the data allows the researcher to be intuitive and sensitive to data as it is collected. "The final product is shaped by the data that are collected and the analysis that accompanies the entire process. Data that have been analyzed while being collected are both parsimonious and illuminating" (Merriam, 1998, p. 162). Exhaustion of sources, saturation of categories, emergence of regularities, and over-extension are four criteria suggested by Lincoln and Guba (1985) to be used when making the decision to stop the data collection process.

The strategies for managing the data are developed early in the study. The researcher looks at and reads through all data from beginning to end to get a general feel for it. Short hand designations are assigned to various aspects of the data for easy identification and referral. The researcher develops a way to keep track of speculations, thoughts, and musings whether they are part of the raw data or maintained as separate files. Management of the data results in its compression and links begin to emerge that convey meanings based on the phenomenon being studied.

The next step is to construct categories or themes that capture some of the patterns and regularities in the data. The categories are abstractions derived from the data. "Devising categories is largely an intuitive process, but is also systematic and informed by the study's purpose, the investigator's orientation and knowledge, and the meanings made explicit by the participants themselves" (Merriam, 1998, p. 179). The labels for the

categories reflect what the researcher sees in the data. According to Merriam (1998), the efficacy of the categories is derived from the constant comparative method of data analysis. Guidelines that should be used in this process are:

1. Categories should reflect the purpose of the research.
2. Categories should be mutually exclusive.
3. Categories should be sensitizing.
4. Categories should be conceptually congruent.

The next step in the analysis process is for the researcher to sort data and conduct a cross-analysis of coded categories. I used software specifically developed for qualitative research to assist in the management of the data and as well as generic software to prepare it. I used computer software to type notes, transcribe interviews, correct, revise and extend field notes and record observations. The purpose was to provide a clean record from which to work. (Merriam, 1998, p. 167). I used software specifically designed for qualitative research for data identification and data manipulation. The use of the computer made the process less tedious and provided new avenues for analysis (Merriam, 1998, p. 168). The program used during this study is classified as a code-based-theory-builder and a conceptual network-builder. The code and retrieve part of the program is designed to assist me in dividing the text into segments, attaching codes to the segments, and finding and displaying all the segments with a given code. The theory building aspects of the program assisted me in: (1) making connections between codes, (2) developing higher-order classifications and categories, (3) formulating propositions or assertions that imply a conceptual structure that fits the data, and (4) testing such propositions to see if they apply. The conceptual network-builder

aspects of the program assisted me in developing semantic networks based on the data (Weitzman & Miles, 1995, p. 18). The computer program does not analyze the data. Instead, it was an aid for me to use in order to be able to spend more time thinking about the meaning of the data (Merriam, 1998).

Trustworthiness

To ensure that this study would have an effect on the practice and theory in education, it was rigorously conducted in an ethical manner. The following strategies outlined by Merriam (1998) enhanced the trustworthiness of this study.

1. Triangulation--using multiple sources of data and multiple methods to confirm the emerging findings.
2. Member checks--taking data and tentative interpretations back to the people from whom they were derived and asking them if the results are plausible.
3. Peer examination--asking colleagues to comment on the findings as they emerge.
4. Long-term observation.
5. Participatory or collaborative modes of research--involving participants in all phases of research from conceptualizing the study to writing up the findings.
6. Researcher's biases--clarifying the researcher's assumptions, worldview, and theoretical orientation at the outset of the study.

Triangulation

To ensure data source triangulation, the respondents were observed in multiple settings and at different times of the day. I used multiple methods of collecting data including interviews, observations and the collection of artifacts. Investigator triangulation and theory triangulation were assured through member checks and peer debriefings using colleagues who espoused a variety of theoretical and cultural points of view. The colleagues, from America and England, reviewed and offered comments and insights to me throughout the conduct of the study. Multiple methods were used to focus on the same constructs so that independent points of view on the same phenomenon could be achieved, thus addressing the issue of methodological triangulation (Stake, 1995, p. 114).

Member checks

Member checks were used to ensure credibility of the study. Respondents were used to review transcripts, test categories, interpretations, and conclusions. During the interview, process interpretations and data gathered from earlier interviews were verified. The transcripts were placed in the respondents' school mailboxes or handed to them in person. Five responses were noted on the member checks and zero respondents added additional information. Informal conversations were conducted with school personnel throughout the data collection and analysis process to ensure that the data and interpretations were a true representation. At the conclusion of the study, the narrative was given to those who participated in the study for their comments before the report was finalized (Appendix F).

Peer examination

Erlandson et al (1993) explain the importance of peer debriefing as part of the data analysis process by saying that it, "...helps build credibility by allowing a peer who is a professional outside the context and who has some general understanding of the study to analyze materials, test working hypotheses and emerging designs, and listen to the researcher's ideas and concerns" (p. 140). I used cohort colleagues and a member of the university Department of Education faculty throughout the study for peer debriefing. The peer debriefing process helped me revise research strategies, organize my thoughts, challenge my conclusions and suggest alternative interpretations. Peer debriefing and member checks assisted me in stepping outside myself in order to view life through the eyes of the respondents (Erlandson et al, 1993, p. 142).

Long -term observation

In order to increase the trustworthiness of the findings, long-term observations took place at the research site over a three-month period of time, at various times of the day, and in multiple settings. Repeated observations were made of the same phenomenon.

Collaborative modes of research

Participants were not involved in the initial planning of the research project. However, the director of research was consulted on a regular basis about the selection of interviewees, locations for possible observations, and in the search for artifacts. The participants played an active role in data analysis through the process of member checks.

Researcher Bias

In a qualitative study, the researcher is the primary instrument for gathering and analyzing data. This allows for the data to be collected and analyzed in an interactive process. "The naturalistic researcher attempts to develop and maximize the observational and analytical abilities of the researcher by utilizing them in situations that provide feedback on their efficacy" (Erlandson et al, 1993, p.39). The goal of the researcher is to infer from the context and the data a design that will provide direction for subsequent data collection and analysis.

Because the researcher is the primary instrument of data collection, all observations and analysis must be filtered through the researcher's lens, which includes her values and perspectives on education, the culture of schools, and information technology. These biases include personal as well as professional experiences (Merriam, 1998). With more than 20 years experience in public schools as a teacher and an administrator, I have extensive knowledge and understanding of the American educational system, the culture of schools, and the use of information technology as part of the educational program. I have had experience in setting up the infrastructure for school based information technology systems and in developing concomitant staff development programs. I am an avid user of information technology personally.

Identification of potential biases is important for the researcher and to the reader. Issues of researcher bias confront the trustworthiness of the data which is dependent upon the trustworthiness of the researcher who collects and analyzes it. Awareness of limitations and biases allows the researcher to have a clearer understanding of the influence of her perspective (Merriam, 1998).

The quality of the analysis is derived from the level of the researcher's competence used in the research design and data collection process. To ensure a high level of competence, multiple data sources were collected over a period of time allowing for verification of consistency of information and aiding in the development of triangulation. Data patterns from different sources and explanations for differences in data from various sources contributed to the credibility of the research. Multiple methods also provided thick, descriptive evidence to allow the reader to follow the study and verify the issues (Erlandson et al, 1993).

Consistency

"[A] researcher wishes outsiders to concur that, given the data collected, the results make sense--they are consistent and dependable.... [T]he question is whether the results are consistent with the data collected" (Merriam, 1998, p. 206). She goes on to suggest three techniques for ensuring consistency and they are (1) the investigator's position, (2) triangulation, and (3) an audit trail. The investigator's position and methods of triangulation have been addressed in the previous section.

Lincoln and Guba (1985, p. 319-320) give six categories of audit trail materials:

1. raw data
2. data analysis and reduction products
3. data reconstruction and synthesis products
4. process notes
5. materials relating to intentions and dispositions
6. information relative to any instrument development

An organized system of records and files were used by me in order maintain the integrity of the inquiry as it unfolded and to enable a review of the study's quality after the fact. A plan was established before the study began on how the audit trail would be maintained. As the study progressed, a determination was made about what records would be kept and how they would be filed to ensure that the audit trail was maintained. A record-keeping system was established that provided, "...a thick description of both the inquiry context and the inquiry process" (Erlandson et al, 1993, p. 149).

Raw data files, data reduction files, and data reconstruction files were maintained throughout the duration of the study. These files contain all information from which the findings were derived. These files include observations, interviews, and artifacts which contain data that were filtered through me and data that is relatively unfiltered such as actual quotes in the interviews and artifacts. "Because they are the closest that the auditor will get to the context being studied, the credibility of the study in the auditor's eyes will be strongly influenced by them" (Erlandson et al, 1993, p. 149).

Times and dates were recorded on all data that was collected in order to facilitate the audit and the study itself. Data reduction files included (1) write-ups that were made to clarify data soon after they had been acquired, (2) categories that emerged to classify data, and (3) computer analysis summaries that were used to manage large amounts of data (Erlandson et al, 1993, p. 150). The audit trail files include notes about the process of the inquiry, notes about intentions and motivations, personal notes, and copies of the instruments and tools. Notes about the process include information on the procedures and day-to-day decisions made during the study. The notes also include trustworthiness notes, which include the steps that were used to enhance dependability and confirmability

(Erlandson et al, 1993). According to Yin (1994), the primary reason to maintain a chain of evidence is to increase the reliability of the information. The audit trail allows the external observer,

...to follow the derivation of any evidence from initial research questions to ultimate case study conclusions. Moreover, this external observer should be able to trace the steps in either direction (from conclusions back to initial research questions or from questions to conclusions). (Yin, 1994, p. 98)

Transferability

"Qualitative research tries to establish an empathetic understanding for the reader, through description sometimes thick description, conveying to the reader what experience itself would convey" (Stake, 1995, p. 39). Merriam (1998) goes on to say that the researcher must provide "... enough description so that the reader will be able to determine how closely their situations match the research situation, and hence, whether findings can be transferred (p. 211). A second strategy used by me to enhance the possibility of the results transferring to other situations is for me to describe how typical the school and program are so that the reader can compare the "case" with her/his own situation (Merriam, 1998, p. 211). A third strategy suggested by Merriam (1998) is for the researcher to select several situations such as teachers in different content areas and purposeful sampling, to maximize the diversity in the phenomenon of interest. This will allow the reader to apply the results to a larger range of situations.

Summary

Chapter III presented the rationale for the design of this study and the methodology that guided it. The section on methodology outlined the guidelines that were followed throughout the study. An overview of the British educational system was

presented. A discussion of the selection of the respondents and site, data collection methods, and data analysis were included.

The determination of trustworthiness, consistency and transferability were framed in the underlying assumptions of qualitative research in which there are multiple constructions of reality, the researcher as the primary instrument of data collection and analysis, and where understanding and meaning are of paramount importance. The question of trustworthiness for this study was addressed by using triangulation, member checks, peer debriefing, remaining on-site over a period of time, involving participants throughout the research process, and clarifying my bias and assumptions. Consistency was ensured by triangulation of the data, examining my bias, and ensuring there was an audit trail. To promote transferability, thick rich descriptions, typical categorical descriptions, and a multi-situation design were used.

CHAPTER IV

HAMPSHIRE SCHOOL

The previous chapters provided background information and described the purpose of this study, the conceptual framework and significance, and the inquiry design that guided it. This chapter will present the data I gathered during fieldwork. Two research questions guided the collection of this data. They are:

1. What are selected teachers' perspectives about the use of information technology?
2. What influences selected teachers' decisions about the use of information technology in the classroom?

The case for this study is a secondary school that I have referred to as Hampshire School for reasons of confidentiality. It is located in a small city in England. The source for all of the information contained in this chapter is my field notes which consisted of observations, interviews, and artifacts. The data was collected over a three-month period of time between January and April 2000. Quotes attributed to a specific individual or sources are so labeled.

Site Selection and Entry

The research design guided the selection of the site which was determined by: (1) the potential of the site to generate data for answering the research questions, (2) my access to the site, and (3) the willingness and approval of the head teacher to allow me to conduct observations, interviews and to collect artifacts.

The aim of this study is to investigate the decisions regarding the use of information technology from the teachers' perspective. The data was obtained from teachers at one school site where they had access to and used information technology. Respondents, undergoing a common experience at a single site, created a bounded unit. A secondary school was chosen because of my interest in this level of education.

An urban secondary school was chosen because it possessed characteristics that were determined to be of interest to the study: (1) teachers had access to computers and other forms of information technology, (2) classroom teachers had varying levels of technological experience, and (3) teachers were using information technology as part of their instructional program. Computers were located in three labs and the library resource room. The labs were open for teachers to use throughout the school day via a sign-up system. Computers were also located in offices of heads of each year group (grade level), in the special needs department, and in administrative offices.

The head teacher and the head of research expressed interest in the research project. A copy of the research proposal and Internal Review Board documents were provided for their review before the final agreement was made. A meeting was held with the head of research to plan for access to the site, arrange interviews, set up a timetable for observations, and discuss possible artifacts.

After consultation with the head of research, and based on his observation and knowledge of the staff, teachers were chosen based on the following criteria: (1) veteran teachers with over five years of teaching experience, (2) technologically advanced teachers and teachers who were just emerging technologically, (3) teachers from a variety

of content areas, and (4) teachers who had the time and were willing to participate in the study.

The head of research identified five teachers with various levels of technological expertise and numbers of years in teaching. Teachers representing a variety of skill levels in technology were used to open the possibility that skill levels could play a role in the decision making process. During interviews, teachers were asked to describe their experience and use of information technology at school and outside of school. The content areas reflected in the respondents included English, history, music, technology, special needs, and geography. I visited the site over a three-month period of time to interview and observe teachers and to collect artifacts.

The Nation

Throughout its modern education history, England has used national exams to rate student performance. In 1988, a national curriculum was introduced. From 1944 until 1988, power lay in the hands of the Local Education Authority (LEA) even though the Secretary of State for Education was given overall responsibility to ensure the effective implementation by local authorities of the national policy "...the Secretary of State for Education was often left fuming on the touchline [goal line]. For over 40 years, governments did little to alter this imbalance; the 1988 Act has done so, radically" (Leonard, 1988, p. 6). The first cycle of inspections began in 1993 by the Office of Standards in Education (OFSTED) where the quality of the education provided by the schools was evaluated. The national student exam system, the introduction of a national curriculum, and the OFSTED inspections that started in 1993 have had a direct and profound impact on local schools. Educational policy and the culture of individual

schools, including the use of information technology, are affected by decisions made on a national level.

In February and March of 2000, local and national newspapers were filled with the news that Education Secretary, David Blunkett, was urging all schools to increase the number of pupils achieving high grades on the General Certificate of Secondary Education (GCSE). Not only did he set the target for each school to get 25 % of their pupils through five high level grades, he also announced that local authorities were being urged to close schools where fewer than 15 % of pupils gain five GCSEs, A* (star) to C. In such a case, the school could eventually be relaunched with a new head, and teachers would have to reapply for their jobs. Across England, 500 schools failed to reach the 25% mark in 1999, one of which was a secondary school in the city where this study takes place (Cecil & Grimmer, 2000).

The Prime Minister, Tony Blair, appeared on national television at the beginning of March 2000 to talk about the difference between student GCSE scores at private schools compared to scores at state funded schools. He made it very clear that he wants the state schools to emulate the scores produced by the private schools. Five hundred fifty thousand children in private schools, representing only 7% of the pupil population, provide more than 20% of those students who make it to the university, and nearly 50% of those go to Oxford and Cambridge. Why is this happening? According to Davies (2000),

In government circles, the answer has been agreed for years: teachers in state schools fail to do their job properly....It is explicit in this analysis that the strength of private schools is not to be explained by their intake of highly motivated children from affluent families compared with the deprived and demotivated children in some state schools. In the government's words, "poverty is no excuse". (p. 1)

This climate of fear created by the politicians permeates every teacher's day with articles on the front page of local and national newspapers, blips on the evening news, and TV specials to examine the issues. Davies (2000) points out that,

The great advantage of the current official consensus is that it allows the politicians to deny all responsibility for [student] failure which is, on their account, entirely the fault of teachers, many of whom now collapse in stress and lose their jobs as a result. (p. 5)

Besides the pressure being put on teachers from the politicians in London, each school is required to be evaluated every six years by the Office for Standards in Education (OFSTED). The first cycle of inspections started for secondary schools in the fall of 1993 and was completed within four years. Thereafter, schools are inspected every six years with more frequent visits to schools that are thought to need closer monitoring. The school in this case study was evaluated in January of 1996 and again in October 1999.

Inspections are conducted according to a set of standards that are the same for all secondary schools. The key elements of inspection include:

1. the quality of education provided by schools.
2. the educational standards achieved in schools (GCSE results).
3. the way in which financial resources are managed.
4. the spiritual, moral, social, and cultural development of the students.

When the inspection is completed, the report is sent to the school and the school is required to send a copy to every parent, the local media, and to local libraries. The local newspaper presents half to full-page articles, on a regular basis about the results of the OFSTED inspections listing the strengths and failing points of each school in the area. As a result of the inspection, schools must produce an action plan to address deficiencies

within 40 working days of receiving the report. The focus of the school, from the point of inspection forward until the next inspection, is on correcting these deficiencies. As a result, information technology may be of secondary importance to the findings by OFSTED.

The national inspection system includes an evaluation of the quality of each teacher's instruction, number and type of courses being offered, and test results of the students on the GCSE exams. It has introduced the concept of the "failing" school.

These are schools where the inspector concludes that the school is "failing to give its pupils an acceptable standard of education" and is in need of Special Measures. The measures include the submission of an Action Plan for approval by the Secretary of State for Education & Employment, monitoring by [Her Majesty's] (HM) Inspectors from OFSTED of the implementation of the Action Plan with regular reports to the Secretary of State on the school's progress, and a demonstration that the necessary steps are being taken to address the key issues identified in the Inspection report. (OFSTED, 1999)

A failing school must show significant improvement within two years to avoid being considered for closure or restructuring with new management and new teachers.

A national curriculum was introduced in 1988. The national government became the primary controlling agent for local education. The balance of power between the local education authority and the head teacher was also altered. In 1993, a system of evaluation conducted by a team of inspectors based on a set of national standards took effect. The school in this case study was evaluated twice within a three-year period of time when the time frame for other schools was six years. To add further pressure to the teaching staff, a more extensive national evaluation system for teachers is looming on the horizon.

The City

The city in which this study takes place has many faces. The travel brochure image is one of a medieval settlement nestled on the banks of a river. The university

plays an important role in the history and life of the city. In the city's heart are the oldest buildings along with the market square with its stalls, which are open year round selling fresh food, second hand Dr. Martin boots, spices in large jars measured to order, used books, clothing, and fresh flowers. On Saturdays, cycle campaign and animal rights activists set up their tables to provide information to the passing shoppers. A small caravan parked on the edge of the market sells hot drinks, rolls, and sandwiches. A couple of plastic tables with chairs are available for the weary shopper to sit for a couple of minutes and enjoy their "cuppa" tea under the awning spread out above the serving window on the side of the van. The caravan is a hive of activity from the early morning hours when the stall sellers arrive to unpack their wares until late in the afternoon when everyone packs up and goes home. During the day the smell of fresh fish is mingled with the aroma of baking potatoes from the jacket potato cart, freshly ground coffee and spices, and the aroma wafting from the fresh flowers. As you round the corner you hear the vendors touting their wares and enticing you to their bargains, "Green onions, three bunches a pound, strawberries picked fresh this morning."

One can wander through the winding cobbled streets of the city past large oak doors and high walls beyond which lie the courtyards of various colleges. Smaller people-sized doors have been cut from the massive wood structures to allow easy access for students and dons to the courtyard beyond. The grand college chapels, refectories, offices of the college dons, tutor rooms, and student accommodation lie hidden from public view. It is rare to see a building over two stories high as one wanders through the streets. Once in a while you will find a narrow passage that allows you to pass between buildings to traverse from one street or area to another. Tudor and Victorian buildings are

interspersed along the way. Pubs stand next to shops that adjoin private residences sharing a common wall with a college. In this part of the city there is the feeling that you have stepped back in time.

On the edge of the city, in sharp contrast, are the modern buildings of the business park that house small businesses many of which are involved in the development of various aspect of information technology. Modern architecture of glass and metal abounds. Paved roads and car parks are interspersed between buildings separated from each other, each housing a particular company. There are not any pubs or private residences in this area; it is strictly business and science. There are no walls to obscure the onlooker's view of the structure but one still wonders what goes on inside. Interest in the latest technologies is high.

The residential side of the city is mixed and reflects the historic traditions of the city as well as the needs for modern housing. Two-story Victorian semi-detached (duplex) and terraced houses are interspersed with post World War II terraced red brick houses and modern detached two story homes and bungalows. Middle class homes are found next to council housing and socially assisted housing. There are areas of the city which are distinctly wealthy and areas where there is a preponderance of middle-class housing, but most of the city is a mix of socio-economic groups. Within the city, housing is compact because land and space are at a premium. The city is surrounded by green belt land that is carefully preserved even though more housing is needed.

Secondary schools supported by public funds are dispersed throughout the residential areas. Students usually attend the school closest to their home; however, students from other parts of the city can apply to attend any school. Scores on GCSE

exams and the league tables in which schools are ranked are selling points for attracting students to a particular school.

Students walk, cycle, take public transportation, or have their parents drive them to school. It would be highly unusual to see a secondary school student driving a car. Cars, petrol, and insurance are significantly more expensive in England than in the U.S. Public transportation is well developed and is used by people of all ages. Using a cycle to get around is cheap, convenient, and a very acceptable form of transportation regardless of one's income level or position in society.

The School

Hampshire School is located in a residential area of the city. A tree-lined boulevard along a major two-lane road lies in front of the entrance to the school. The houses along the street are set close to the road with tiny flower gardens or a paved space for a car in front of the house. Gardens with flowers and green lawns extend from the back of the houses. The semi-detached houses have only a few feet of space between their structure and the next one.

Until you are directly in front of the drive that connects Hampshire to the main artery, you are not aware that there is a school close at hand because it is set back behind a row of houses. Across the street from the school is a white arrow shaped sign with black writing that says community college, which is one of the English equivalents of a secondary school. Someone has turned the sign so it is pointing away from the school. There is a light controlled pedestrian crossing near the drive to the school that can be activated by the push of a button to stop the traffic to allow students, staff and parents to

cross the road safely. A small rectangular metal framed blue and white sign at eye level on a brick pillar shows the name of the school.

The school buildings reflect the compact nature of the city. The main buildings were built in the 1930s and are one and two story reddish brown brick buildings in a U-shape surrounding a courtyard that doubles as a parking area for staff cars and bicycles. Most of the buildings are 60-years-old, which is young for buildings in England. Over time, walls are painted and new floors are laid even though buildings remain relatively unchanged over long periods of time. This can pose challenges for schools as they try to adapt the facility to match the needs of a modern secondary school.

Signs are strategically placed at the junction of the entrance drive and the courtyard to direct visitors to various departments and to the main reception area that lies directly across the courtyard from the entrance. A large sign over the entrance to the main reception has the name of the school and the word "Enquiries" with an arrow pointing to the left side of the double door entrance. There are flower boxes and benches in front of the main entrance, which makes for a warm and inviting atmosphere. As you enter the door, there are several reception secretaries with friendly and inviting personalities. They always greeted me with a warm hello and were very helpful in locating people. The school does not have an intercom system. There is a long table directly in front of the door upon which are placed the attendance rosters at the beginning and middle of each day. Student aides can be seen throughout the day managing the attendance information while sitting at the table. On the right side of the reception area is a set of matching lounge chairs set in an L-shape along the wall for visitors. On the low table in front of the chairs is a school scrapbook that contains newspaper articles and pictures of events that

have happened at the school. One newspaper article shows students from the school receiving some hand-me-down computers from a local business. The scrapbook contains articles and photos about various programs in the school, fund raising projects, and the adult community courses. Behind the chairs is a lovely display of student artwork and over to the side is a large glass cabinet with three-dimensional displays of student artwork. The reception area is always very busy, as it is full of students and staff going to classrooms on the second floor. Teachers and students enter the library resource room, and staff enter an office to do reproductive work.

Diagonally across from the waiting room chairs is the entrance to the library resource center. As you enter the room you pass through a security arch. On the right hand side are several desks for the librarians. A computer sits on one of the desks and is used to check out books. Along the same wall are two small windowed offices, one for the librarian and the second for the Information Technology coordinator.

Directly in front of the offices are 3 rows of computers sitting back-to-back making a total of 20. The computers are connected to the Internet and the speed and capability of the machines makes it practical to use word processing, spread sheet, publishing programs, and the CD-ROMs. Currently the school has only two Internet connections to the outside world. However, that will soon change with a new microwave link that will increase the capability and speed of the Internet connection. At the moment, the Internet is very slow in the afternoon and is thus frustrating to students and teachers alike. That, however, does not deter the students from coming in before or after school and during the breaks to use the computers. The computer area of the resource center is always packed whenever it is open.

Continuing on around the room, there is an area of tables to the left of the computers. Small classes and groups of students meet with teachers during the school day, and after school homework club students meet in this area to receive help from a supervising teacher. Next to this area are the library stacks. Approaching the entrance from the bookshelves are round tables with chairs and lounge chairs for students to sit, read, or study. The room has high ceilings, lots of windows and is light and airy. The resource center is open for student use before school, during the mid-morning break, at lunch; and after school. During the day, teachers can reserve the computer lab for their own instructional purposes. A sign-up sheet is in a notebook on the librarian's desk. The information technology teacher also uses this lab to teach IT classes to students. Next to the library resource room is another computer lab that has a security push button lock on the door only for with the code to enter. Computers are located along the walls and on tables in the center of the room. A similar sign-up procedure to the one in the library is available for teachers on a first-come-first-served basis. The sign-up sheet for this and two other similar labs is located in the staff lounge.

The brick exteriors of all of the buildings are rather plain. Nine buildings make up the site. The buildings are either a few feet away from each other or physically attached to the next building, so one can walk through most of the school buildings without going outside. However, it is much shorter to go outside to cross from one side of the courtyard to the other instead of taking the long way around the U-shaped buildings that surround the courtyard. Subject area classrooms are located close to each other or occupy a single building such as dance and drama, design and technology, music and science.

As one enters from the main drive, a long two-story classroom building occupies almost the entire length of the right side of the courtyard. It has four entrance doors evenly spaced along the face. Every few feet there are large six-foot multi-paned windows on both the ground level and the second story. The windows have cloth curtains of various neutral colors, some open and some closed. The building is only wide enough for one classroom and a hallway. Two assembly halls and the canteen are attached to the back of the building. The two assembly halls are big enough to sit 200 students on the floor or 100 people in chairs at any one time. There is a small stage at the far end of the first assembly hall. The classrooms face the courtyard. On the back of the long building are solid windows above a three-foot exterior brick wall. This wall of glass is one side of the hallway and looks out on an asphalt playground area and a grassy area in front of another modern single story brick music building. At the other end, a porta cabin houses the dance and drama program. Looking out of the hallway windows one can see a second entrance to the school grounds at the end of a dead end street of terraced two story narrow pre-World War II houses. The last houses on either side of the street border the school yard security fence which is six-feet high and spiked. The tops of the gates are coated with non drying paint. "The college cannot accept any liability whatsoever for any damage or personal injury caused as a result of ignoring this warning." follows the "Warning Do Not Climb".

Mathematics, languages, English, humanities, history, and the special needs resource rooms are located in this building. The classrooms for each subject area are clustered together in various parts of the buildings. Colorful and informative boards reflecting the subject areas are frequently found along the corridor walls.

Bulletin boards containing student work, concepts and philosophies, and announcements of upcoming events are scattered along the corridors in all buildings. On the "Personal and Social Education" bulletin board the word "Decisions" is outlined in bold letters above a photograph of a famous black English athlete Lindford Christie. Below the picture is the question, "What do you see, gold or black?" This is in reference to all the track gold medals he has won. Under the section labeled "Opinions," the following quote dominates the space: "As long as there is poverty in the world, I can never be rich even if I have a million dollars. I can never be what I ought to be until you are what you ought to be." The author is Martin Luther King from the United States. A large photo of Nelson Mandela takes center stage under the heading of "Hope".

A bulletin board with a multi-ethnic theme hangs on the wall of the second floor corridor. Student who come from homes where English is not their first language comprise 12% of the population. This is above the national average (OFSTED, 1999). There are announcements for the multicultural games club, the first language GCSE club, and a group called "Speak for Yourself". The mission statement of the multicultural education service is displayed. It reads,

We believe that all pupils are entitled to the highest quality education. We work in partnership with schools and parents: to enable mainstream services to meet the needs of our diverse society, to raise the achievement of Black, Bilingual and Traveller children, and to prepare pupils to participate fully in the multicultural society in which we live.

Religious education pictures are displayed on several bulletin boards. The photographs portray multiple faiths and are labeled with words like empathy, attitude, prayer, sensitivity, community, cultural awareness, customs, and open mindedness.

There is a Latin bulletin board in the hallway near the staff lounge. All of the student work displayed on the board is done by hand, not on the computer. In the center

of the board is a list of Latin phrases with their translations. They include *prima facie*, at first site, and *modus operandi*, which means method of working.

The English bulletin board contains a display of poems written by students. Some of the poems have been produced using a word processor while others are neatly handwritten. Each work has been glued to a colored piece of paper to set it off from the others and to provide a type of frame. The presentation seemed to say that each poem had a value all its own.

On the doors to the classrooms are posters that list the expectations for students. Being punctual, patient, polite, positive, and prepared are the five "P" guidelines for behavior. On the door to the home economics room is a large poster showing various aspects of the food industry. The script below the pictures reads, "Food technology is using knowledge and skills to design and make good quality food products".

The halls and classrooms do not look terribly clean even first thing in the morning. It is not that they appear dirty but the floors do not sparkle and with paint peeling here and there, the school has a generally worn appearance instead of a well-preserved look. With students walking in and out of buildings all day and with the rainy weather in England, the already worn looking floors are quickly covered with dirt from shoes which adds to the slightly unkempt appearance of the school. Having said that, however, the walls are clean and free of graffiti. Throughout the school, colorful student artwork is exhibited. Recent projects reflecting the multi-ethnic nature of the school are displayed as well as more permanent large three foot by three foot painted collages. The paintings are in the long corridor hallways as well as stairwells virtually everywhere you go. Prints of classical paintings such as by Monet are framed and hanging on the walls as

well. The art is a clever way to draw attention away from the worn walls and chipped paint and provides a wonderful forum for the display and exhibition of numerous pieces of student work.

The first building on the left hand side of the courtyard is a two story brick building that houses most of the science department. The next series of buildings are attached to each other so you can walk from the main entrance drive all the way to the main reception area. Along the way you pass a pottery studio, printmaking room, swimming pool, locker room area, gymnasium, science labs, business studies, and design technology classrooms. A parking lot, grassy area, and all-weather floodlit tennis courts are located behind this row of buildings.

Directly above the main reception area is a very large staff lounge. It will comfortably seat all the teaching staff at one time in stuffed lounge chairs. The room is carpeted and has a 20-foot ceiling. Coffee tables are interspersed throughout the room and there are three long wooden worktables at the front of the room for teachers to use. The front of the lounge has cathedral windows that look out over the main courtyard. The room is filled with light and is a very comfortable and quiet place for teachers to retreat to even though very few are found in there during the school day. There is a small room off the main lounge with coffee and tea making facilities. Another small room with about 15 chairs and a table can be used for conferences, committee meetings, or for me to interview teachers in a quiet, private location. In one corner is a desk with one computer and a printer for staff use. On only two occasions during the three-month research period did I observe a teacher using this computer during the school day.

The walls of the lounge are covered with bulletin boards, all organized according to topic. One board has information for each year group, another about special needs, and a third has details from the teachers' union. A fourth bulletin board is dedicated to IT. It contains the sign-up sheets for three computer labs. One of the labs is located next to the library resource room. A second lab of 16 computers is located in the main classroom building on the ground floor near the canteen, whereas a third lab is in the business wing. It has just opened and contains 10 computers. The sign-up sheets are a grid with times for scheduled IT lessons already filled in. The IT lessons take up 20 of the 90 slots available. Each lab has a separate sign-up sheet. Teachers pencil in the times they want the lab and for what class or year group. For each week there are 30 slots based on six periods per day times five days per week. The sign-up pattern was the same regardless of the week or the schedule. There were slightly fewer white squares indicating that the lab was empty than squares with names filled in. There are six teacher's names that appear again and again with one or two names that pop up once in awhile. The subjects represented on a regular basis included science, physical education, English, math, humanities, business studies, and learning support.

On the same bulletin board, there is information on IT training options offered from different organizations including desktop publishing, word processing, spread sheet training, and data base management. A sign-up sheet for computer training called "Twilight IT Sessions" is posted. There are twelve names on the list. The IT coordinator offers these sessions to teachers who have very weak IT skills. The idea is to give them foundation skills in IT so they can begin to pursue more advanced training in some of the

areas listed above. Teachers volunteer to attend these sessions. There are no training opportunities listed on the bulletin board for how to integrate IT into the curriculum.

The Respondents

Respondents were chosen because they matched the identification criteria set at the beginning of the study. The respondents were interviewed on site. Observations were conducted in the teacher's classroom, in the staff lounge, and in IT labs. For the purposes of confidentiality, respondents have been given names. All of the respondents were male except for one teacher. This does not reflect the gender breakdown of the site. Specific subject areas and year levels have been slightly altered for confidentiality purposes. However, the substance of the data remains the same.

Mr. Darby is an experienced user of information technology and has 15 years of teaching experience. He has been at this site for his entire teaching career and first began to use a computer when he studied for his masters degree. He has a computer at home that he uses for word processing and for surfing the Internet for research purposes. His child, who is only four years-old uses the computer on a regular basis.

Ms. Chamberlain, who has 26 years of teaching and 12 at this site, is also a very experienced user of IT both at home and at school. Her husband is a scientist at the university, and she has had a computer at home for many years because of his use of it in relation to his job. Her children are avid users of computers as well.

Mr. Hardcastle is a science and IT teacher. He has been teaching for 28 years. The vast majority of his teaching experience is as a science teacher. When he came to Hampshire 15 years ago, he was hired as a science teacher. He became the IT coordinator 8 years ago as a result of a proposal he wrote to be used as a plan for the school to

develop IT. He has been using a computer as a science teacher for many years. According to Mr. Hardcastle, science teachers were the first teachers to have computers, which they used for scientific experiments in their labs.

Mr. Windsor is fairly new to the profession and to Hampshire School. In his previous school, the teachers were required to do IT lessons even though the lesson might not have been appropriate for the instructional content. They felt it was more important to meet the requirement by ticking the box than to prepare a lesson that was a direct match to instructional content. To reiterate, even though the teachers in his previous school used more IT than at Hampshire, it was done to fill a requirement and not because the teachers saw any benefit in the integration of computers into the curriculum. Mr. Windsor has just started to use a computer at home. He can do basic word processing and loves to surf the Internet for information. By surfing the net he has been able to find information that has been valuable for instructional purposes. Other members of his department have shared CD-ROMs with him that he has found applicable to his program. He does not rate himself as an experienced user of technology.

Mr. Pryor had been a geography teacher for 28 years, working at Hampshire for 22 of them. He has a computer at home, but he has used it very little due to a lack of time. In fact, the computer is now so old that a recently purchased software package cannot be installed because the computer does not have enough memory. He is currently putting in an application for a government scheme that will give teachers a £500 rebate on the purchase of a computer costing at least £1,000. According to the March 13 edition of the London Times Education Supplement, 22,000 teachers have now applied for the rebate. Mr. Pryor has been taking advantage of the "Twilight" computer classes in order to

improve his skills and also because he has to show that he is pursuing computer training in order to qualify for the rebate.

I had conversations with other respondents during the course of the study, including students, the head of research, a school governor, a new student teacher and other teachers in the IT labs, the staff lounge, or in the hallways.

A Typical Day at Hampshire Secondary School

The source for all of the information contained in this section is my field notes, observations, interviews, and artifacts. The data was collected over a three-month period of time between January and April 2000. Quotes attributed to a specific individual or sources are so labeled. The thick rich description is a compellation of the data contained in the field notes.

The caretaker walks down to the main gates of the school and unlocks them at around 6:00 in the morning. The metal gates are swung back to allow cars and pedestrians to enter the main drive leading up to the courtyard at the center of the school. Before 7:30 there is very little activity. The pace starts to quicken at about this time because the community room opens for the breakfast club at 7:45. Students, cycling or walking, and staff in cars or on bikes come down the drive to the main courtyard. The students whiz around to the back of the buildings where there is covered parking for about three hundred cycles and another hundred and twenty spaces in the open air.

The caretaker opens the outside doors to buildings after he unlocks the school gates, but the classroom doors remain locked until the teachers arrive. As one enters the large classroom building on the left of the courtyard, the aroma of food being cooked on the grill and freshly brewed coffee tantalizes the nostrils. The cook and monitor arrived

earlier to set up the food and the room. Students and staff can have a cooked breakfast while sitting in lounge chairs around a table or just having a little quiet time with a "cuppa" tea before the rush of the day begins. Some of the students who come for breakfast have tickets that allow them to have a free breakfast; others pay. Students who are eligible for free meals make up 15% of the school population which is broadly in line with the national average (OFSTED, 1999). The breakfast room is much more like a lounge than a cafeteria.

At 8:30, the chairs at the computers in the library resource room are starting to fill. Students have their own log-in and password. They are very focused and know what they want to do. They are fairly quiet and insular but greet each other as more students enter the lab area. By 8:40, the lab is full.

By then the vast majority of staff is assembled in the staff lounge. Teachers are picking up their mail from the wooden cubbyholes labeled with their name. Some are sitting quietly sipping a cup of hot coffee or tea while others chat vigorously as they sit around a table. A few teachers remain standing while talking to colleagues. At 8:35, the head teacher says good morning to everyone and smiles as she looks around the room. She asks how many people have announcements, and ten people raise their hands. After making a few brief announcements, she then starts to call on teachers who had previously raised their hands. Announcements are made about administrative issues as well as pleas for assistance on a particular task or information on upcoming events. At one point, a staff member makes a plea for teachers to return the "lounge" cups to their rightful location and then makes a reference that most people in the room appear to understand

because they all laugh. The head joins in on the friendly banter and then wishes them well for the day before they exit through the only door to the lounge.

It is now 9:00, and a group of students is walking into Ms. Chamberlain's advisory period. The students have been divided into year groups 7 to 11. The Year 11 students are around 16 years of age. Students are tracked by their year in school and their ability; on the two extremes are the high and low ability groups. In the middle is the catchall category of "mixed". The students are dressed in the school colors. "The uniform of [Hampshire] is reasonably strict, but there is room for choice. You can choose which colour [color] jumper you wear [purple, black or grey]" (School prospectus 2000, p. 2). Most of the students wear a shirt or sweatshirt and a pair of dark trousers or jeans. Here and there a few skirts can be seen on the girls. The most popular footwear is trainers (tennis shoes). The students carry their books and other paraphernalia in backpacks of various colors and descriptions.

Ms. Chamberlain begins the short advisory period by checking with several students about their previous absences and then she calls roll. Ms. Chamberlain addresses the students by their first name. The students all respond with "yes miss" or "miss" regardless of whether or not the teacher is married. The teacher is marking the attendance on a computer scantron sheet and once the roll is complete, a student is asked to take the notebook with the attendance form to the office. After Ms Chamberlain reads an announcement, the bell rings and the students and teacher leave the room. This classroom does not have a computer in it nor has the room been wired to accommodate computers in the future even though this building is only a couple of years old.

In Ms. Chamberlain's special needs room, she currently has one lone computer that is used primarily for administrative work. She had several computers that she used for instructional purposes, but those computers have been removed in preparation for the addition of a bank of new computers. Ms. Chamberlain wrote a proposal to get a project funded for moderate to severely handicapped students. Her proposal included the need for computers as part of the instructional program. The government has funded her project, and she is anxiously awaiting her new computers.

After leaving Ms. Chamberlain's registration period, the students move quickly to their first lesson. The students line up in single file outside the classroom until the teacher gives them permission to enter the room. They continue to chat as they wait in line. Mr. Darby stands at the door and directs them into the classroom. The students file in and take their pre-assigned seats. The room is filled with 16 two-person tables. There is one row of four tables next to the outside window wall of the room while two rows of tables fill the middle of the room. The tables are right next to each other with no aisle in between. The fourth row is up against the hallway side wall of the classroom. There are about five feet of space between the front desks and the white board on the wall in front of the classroom. A small wooden teacher's desk is crammed into the corner by the window. Since the teacher's desk is against the front of the student's desk there is barely enough room to pull out the chair behind the teacher's desk before it hits the wall of the classroom. There is no room to walk around the back of the classroom. The student's chairs in the last row are up against the wall of the room. Thus, every inch of room in the classroom is taken up with student desks.

This is a Year 7 history class of mixed ability students. Mr. Darby begins the class by taking roll. "Yes sir", "sir", "yes sir" are the student responses when their names are called. The teacher asks two students to hand out a softcover book on Medieval history to each student. "One or two boys have jackets on that are not the school colors," the teacher announces. Two students take off their jackets and hang them on the back of their chairs. Mr. Darby asks the students to turn to a table on page 88 and then begins to explain the type of information that can be gleaned from the table. After a brief explanation the teacher asks, "What else does the table tell us"? "How they died," responds a student in reference to the list of kings. Mr. Darby goes on to say, "I wonder how we can present this information in another format." "How many died a violent death?" The students begin the count individually. As the lesson proceeds, the teacher prompts the students to collect different types of information from the table and then he suggests other formats such as a pie chart they can use to present the information. After the students have drawn a pie chart in their individual lesson books, the teacher asks them to speculate on what this information is telling them about this period in history. One student suggests that there were lots of wars. Another goes on to say that, "It wasn't a very nice period of time to be king." Mr. Darby expands on this idea by telling the students that, "The job of king came with a high risk of death."

The lesson progresses in this same fashion. The students are asked to extrapolate pertinent data from the text, present it in a usable format, and then examine the information and speculate on what the information is telling them. The discussion is carried by about half of the students in the class. However, all of the students are actively

involved in extrapolating the information and making the charts and graphs in their lesson books. The pace of the lesson keeps the students actively involved.

One student is particularly challenging to the teacher; however, he handles her in a very caring and confident manner. He turns to the student and says, "Mary, remind me of what page we are on," when the student became distracted from the task at hand.

When the students begin working on their graph, Mr. Darby goes directly to Mary's desk to help her get started. A few minutes later he says, "Mary, do you have a circle drawn?"

As the students work, Mr. Darby manages the classroom by walking around which is difficult because of the crowded nature of the room. He responds to student hands, looks at individual student work, and complements various students as he moves up and down the rows. When he notices that several students have completed the initial task, he asks them to expand their information to two more kings whose information is located on the next page. This strategy keeps all of the students busy. Just before the end of the class, Mr. Darby asks the students to rate their performance for the day. He describes what the high score of five would mean. "You behaved perfectly, you raised your hand frequently to answer questions, you answered questions, you worked quietly on your seat work." The teacher calls each student's name and he/she gave him a score. Most of the scores are threes and fours. "I think some of you are being more honest than others. A four is quite a high score." Mr. Darby summarizes the lesson and the bell rings. "When ready, stand quietly behind your chair." He dismisses the students row by row.

The next group of students is already lining up outside the classroom as the first group makes its exit. Mr. Darby nips next door for a moment to speak to his colleague, and, upon his return, he invites the students to enter the classroom. In the previous class

there were 23 students present and 6 were absent. In this class of high track Year 8 students, there are 25 students with 4 absent. The classroom has chairs for no more than 32 students. The average class size for Key Stage 3 is 25 and for Key Stage 4 classes it is 26 (OFSTED, 1999).

The students are very chatty as they enter the room. Mr. Darby asks, "Could you stop talking please." The noise level of chatter is slightly reduced. "That was a very polite request and I expect you to respond straight away." The students quiet down, and he begins to take the roll.

Mr. Darby begins to introduce the lesson by explaining that he is going to use a video of the Spanish Armada for the lesson. He does not want the students to take copious notes. "Do you think it is fair or balanced and be able to show your evidence," he explains. He asks the students to open their lesson book where they are to write the question, "In your opinion, does this video give a balanced view of the Spanish Armada?" He gives them a hint that the music in the background might be an important link. Mr. Darby starts the video. After a couple of minutes, he puts the video on pause and asks the class, "What words did they use in regards to Spain?" A student replies, "Terrifying growth." Mr. Darby asks them to note that in their lesson book and starts the video again. After a short time, he pushes the pause button. "What impression do you get of Spain?" "They were greedy," responds a student. This same procedure continues for the first ten minutes of the video. Mr. Darby gives them ideas on how to focus on the vocabulary that is being used, the tone of voice of the narrator, the music in the background, and the pictures they are using to depict the event. After this introductory phase, he allows the video to continue with the students jotting down their evidence.

"I think we have enough evidence. I want you to answer the question and back it up with evidence. Use a couple of sides. You are to do this on your own paper." The students start to work, and Mr. Darby sits at the teacher's desk in the front of the room. All of the students are quietly working on the writing assignment. When the class bell rings, students are reminded that the assignment is due the next class. They are asked to stand behind their chairs and are then dismissed.

It is now morning break time. The teaching staff gathers in the lounge where one of the canteen staff is selling coffee, tea, biscuits, and sandwiches. Teachers quickly form a queue next to the trolley and purchase their goodies. They sit in groups around tables and chat, or stand in twos and threes talking. A small group of teachers is gathered around a guest, a musician and singer from Zimbabwe. He is working with the students in the music classes and is scheduled to perform for the Year 7 advisory classes right after lunch. The teachers are excited to see him again and are listening attentively to his tale of return to England after having been gone for several years.

One group of teachers is talking school business particular to the science department. Another group is discussing a program on the telly (TV) from the night before. The special needs teacher is chatting with a teacher about a student and she is asking how the student is coping. Two English teachers are discussing a new piece of computer software discovered by one of them.

During the break, the students are gathered in hallways, classrooms, outside in the courtyard, or on the playground. A group of boys in the corner near the fence is trading Pokémon cards, which are not allowed at the school. A group of girls is chatting about

boys, and another group is playing a ball game. In the hallway a student is leaning over his pack and taking out a candy bar.

At the beginning of the break period, there is a rush of students to the library resource room to see who can get a computer first. All of the computers are spoken for in the first minute of the break. Several computers are being used by a group of students at the same time to check their Hotmail. Two boys are checking up on the latest ways to cheat on a video game, and another boy is checking out the web site of his favorite soccer team. Hotmail is the predominant choice of activity. Two students working together to locate some information on the web for their science class and print the article they have located. There are a few more boys than girls at the computers; however, it is a pretty mixed group by age and gender.

After the break, I follow the special needs teacher Ms. Chamberlain into a classroom. Students who have a "statement" (Individual Education Plan) have met the criteria to receive special education services. The local education authority has made a statement of special education need (SEN) on 27 students. This is in line with the national average. However, 22% of the schools population is at some stage in the referral process for SEN which is well above the national average (OFSTED, 1999). "Together with subject teachers, we aim to ensure that all pupils are able to participate fully in their lessons and find learning an enjoyable experience" (School Prospectus, 2000, p. 15). In this particular lesson, the learning support teacher sits next to a student in the second row of tables. The classroom has the same basic configuration as the previous classroom with four rows of two-person tables facing the front of the room. The helping teacher takes notes along with the rest of the students in the class and talks softly with the student

beside her throughout the lesson. Near the end of the lesson, the classroom teacher makes a reference to Spam. Students in the class have never heard of it. The teacher asks the special needs teacher if she is familiar with Spam. She smiles and says yes. Other than this brief exchange, the two teachers never talk or interact during the lesson.

Special needs students are also seen in the resource room at times but the preferred model is to include students in regular lessons. Special needs teachers also work with groups of students whom the school has determined would have difficulty learning a second foreign language. Instead of taking the second foreign language, these students are given extra instruction in various forms of communication including speaking, writing, and using the computer. This class pays regular visits to the computer labs to learn new skills and to complete work for other classes, such as reports that are written using a word processing program.

The fourth class of the day is an English class for a year seven group. Mr. Windsor stands near the door as the students line up in the hallway. He gives a hand signal for them to enter the room. Then students move to assigned seats, sit down, and begin to take out individual reading books, a lesson book, and a pencil case. There is a special needs teacher in the room who immediately begins to check with several students and then sits next to a female student in the last row of the classroom.

There are 27 students in the class with 3 absent. The room has 17 two-person tables with the teacher's desk located in the front of the room on the window side. There are two small aisles between the rows. There is no room at the back to walk between the rows. Only one window has a curtain; the others are bare. Student work and posters depicting various authors and books are neatly displayed on the back wall.

During the first ten minutes of class, students read silently from their books as the teacher circulates around the room. He has selected students to read and tell him a bit about their story. The special needs teacher leaves the room with one student but they return near the end of the reading period.

Mr. Windsor begins the main body of the lesson by handing out an A4 size piece of blue paper to each student with a flow chart type diagram of the parts of a story. He asks the students to recall how far they had progressed during the previous lesson. He tied the current lesson to the previously covered material by asking them open-ended questions. Mr. Windsor wraps up the introduction by saying that we can learn through the boy's experience, and it is important to realize that there is a moral to everything. "Today what we are going to do is write our own tale. How are we going to do that?" asks Mr. Windsor. He answers himself by explaining to the students how to set the scene in the first paragraph. He outlines the characteristics he would like to see in the paragraph, and then he gives several examples. He goes on to say, "You've written about a dwelling, and you have drawn a picture of a monster." The next step was for the students to describe the setting for their story in their lesson books. "Think who you are writing for. You are writing for this little boy. Get him to understand how you are feeling," says Mr. Windsor. They eagerly begin to write. Mr. Windsor and the special needs teacher walk around the room looking at student writing and responding to student questions.

Before Mr. Windsor asks the students to put down their pens, 15 minutes pass. He asks, "What kind of paragraph do you think should come next? Paragraphs have a particular job. I'm a paragraph; what is my job?" "To talk about one subject," replies a student. Mr. Windsor continues to draw ideas from the students, and at the same time he

is molding their thoughts on what should take place in the next paragraph. He prompts them to start writing again. "You've got two minutes to start before you lose those ideas." As the students start to write, he says, "If you have any questions, raise your hand." At that moment, a student burps loudly. Three or four boys laugh. One of them proclaims, "That was Jason." Mr. Windsor ignores the whole situation and continues to help several students with their writing. The boys immediately quiet down and begin to write.

The bell rings. "Please put your books away," Mr. Windsor says above the quickly increasing level of student chatter and noise from pushing back their chairs and standing up. Students quickly file out of the classroom without further prompting from Mr. Windsor. One of the special needs students stops to show Mr. Windsor her writing. Mr. Windsor looks at it and says, "Good! Good! You need to think about...." The end of the comment is lost in the noise created by the students leaving the classroom. Mr. Windsor smiles at the student as she leaves the room at the tail end of the exiting students.

The lunch break is next on the schedule. Within seconds, the lunchroom is filled with students and staff. An a' la carte menu is available with warm main courses including casseroles, pizzas, and the most popular item, chips (french fries). A separate table has large bowls of different kinds of salads to choose from. Jacket potatoes (baked potatoes) with various fillings are also available. After filling their plates, students and staff pay with cash or a lunch ticket and proceed to the dining area. Round tables with chairs are primarily filled with students. However, there are teachers and other staff members interspersed throughout the room. Three students share a table with four adults

at one table. One student has decided that all she will have is a dessert, one has a plate of fries, and one has brought her packed lunch from home. The students carry on their own conversation while the adults carry on theirs.

If students want to use a computer during the lunch hour, they do not eat lunch. The library resource room immediately fills with students on a first-come-first-served basis. Since there is no time restriction, once a student gets a computer, he/she can keep it for the whole lunch period. A few of the students from before school and the morning break period are here again. However, most of the faces are new. Hotmail and surfing the Internet are the primary choices. Several students are looking for information on the web that they will be used as part of a class assignment. Two students are using a word processing program to type class reports.

The staff lounge has seven teachers who stay for most of the lunch period. Teachers wander in and out, mainly to check their mailboxes. No one is using the computer in the corner.

After lunch, all the students report to an advisory class. As in the initial short advisory period at the beginning of the day, the students have been grouped by year. Ms. Chamberlain quickly takes attendance and the group is advised to go to the assembly hall where they will hear a concert by the visiting Zimbabwean musician. Students grab their bags and head off with the teacher close behind. Each group of students has been assigned a sitting space on the floor. They plop down while the teacher takes a chair from the stack on the edge of the room and sits next to the group. Mr. Darby tells the entire assembled group a little about the musician before he gives the students a brief explanation of the instrument he is playing and the pumpkin like shell he is using to

enhance the sound effects. On the second number, the musician teaches the students the chorus and asks them to join in. Following this number, students are asked if they have any questions. One student asks about the shell and another one asks how he learned to play the instrument. He is very cordial and responds with ease to their questions. The half-hour is soon over and then students leave the assembly hall for their period five class.

In the library resource room, a lesson is being organized by the IT coordinator Mr. Hardcastle. Students enter the room, pick a computer and begin to log in. It is obvious from the introduction to the lesson that they are working on a series of projects with the ultimate aim of creating a portfolio showing the products they have produced that represent different skills. The first project was to create a magazine on the subject of their choice using a publishing template. The second project involved the creation of a PowerPoint presentation. Again the students had selected their own topic. The objective was to pull information and pictures from the Internet and create slides for a presentation. The new project that the teacher introduces requires them to find information on St. Patrick's Day on the Internet, select text and pictures, and create a poster to celebrate St. Patrick's Day.

Mr. Hardcastle asks the students if they know who St. Patrick was. "A dead man," came the first reply. The teacher goes on, "Patron saint of," and leaves a student to fill in the blank, "Ireland." "If they had a party in Ireland, what might it look like?" questions the teacher. The teacher-directed discussion continues to help the students identify keywords they could use in the Internet search. Mr. Hardcastle asks a student to remind the class how to copy a picture from the Internet and to paste it on to a new document. At

the same time that the student is explaining, the other students are already working on Internet searches and documents from previous lessons. The teacher and a parent helper spend the rest of the class period wandering around the room offering assistance on how to accomplish a specific task and giving students hints on how to create an attractive poster. "What is the message you are trying to convey?" asks the teacher. "Can you see that color of print from very far away? Stand up and back away from your computer. Can you read it?"

Only a few of the students have good keyboarding skills. Most of them hunt and peck at the keys although they do so with a fair degree of accuracy and speed. One of the students has English as a second language and he is struggling to type the words necessary to do an Internet search. Two of the students in the class are part of 22% who are in the referral stage for special needs. They are also struggling to read and understand what needs to be done. Most of the students are very attentive to their tasks except for two boys over on the side who are spending most of their time talking to each other instead of working on the lesson. There is constant chatter between the students who are anxious to share their accomplishments with their neighbors and the teacher.

"There are four machines over here for those who are having problems," announces Mr. Hardcastle. Six students get up to move but there are only four operational machines that are not taken. Four computers already have students doubled up on them. "This is a really stupid machine," proclaims a student in a rather loud and frustrating voice. "Why is that?" asks the teacher. "Because it is so slow," replies the student. The teacher explains to the student that the Internet is always slower in the afternoon because it is the time when all the Americans start to use it and it clogs up the system. He says

this with a wink of the eye to me because he knows that I am from America. Mr.

Hardcastle goes on to say that in a few weeks time a new microwave link will be made to the school. The speed will increase from 100 kilobytes over the present two phone lines to 10 megabytes with the microwave link. He can't wait for this to take place because he sees the future of IT education centered round the use of the Internet. He believes that schools should be technocentric instead of being centered on content areas. He tells me in a later conference that the new IT curriculum will be coming out later in the year, and it will change the focus of IT instruction to skills associated with the use of the Internet. He is looking forward to this change.

All pupils receive one IT lesson a week in Year 7 and one a fortnight [every two weeks] in Years 8 and 9. [Hampshire] has three networked suites of PC-based computers. This allows extensive use of the CD-ROM facilities, business standard Microsoft software and access to the Internet. In Year 10 a GCSE short course is available for pupils who opt for the shortened Technology course and who would like to extend their IT experience. (School Prospectus, 2000, p. 17)

The role of the IT teacher is not only to teach the one thousand students but also to help the 60 teachers learn IT skills. Mr. Hardcastle finds the job impossible to do because he has a full schedule teaching IT lessons and science lessons. The only time left to work with teachers is during his preparation periods and after school. That is when the "twilight classes" are offered.

Mr. Hardcastle is off to teach a science lesson for the last period of the day. Mr. Windsor enters the library resource room with a class of 28 students who quickly sit down at the computers and begin to log in. Several students cannot find a working computer so they have to double up with other students. The lab technician is sick today and it appears that student use of the computers during the morning has caused the

computers to malfunction. There is no one else available to help sort out the broken computers.

This lesson is obviously a continuation of a previous lesson that requires the students to access information from a CD-ROM. They are searching for information that they can use in a paper that they are writing for the class. Students are being required to use a word processing program to complete their paper. Mr. Windsor has scheduled three consecutive class periods to complete this lesson. He explains that it is difficult to schedule time in the lab because he has to plan so far in advance in order to get the exact class periods he wants. The school operates on two different schedules depending on the week. "You can't always guarantee that the lessons leading up to the time you have scheduled the lab will be completed in time to go on to the use of the computer lab," says Mr. Windsor. "Sometimes it is easier to complete all the coursework for the term and then schedule the lab afterwards."

The number of working computers is also an issue. Students do not seem to mind doubling up, but their productivity level is lower when they share. The variation in student skill levels is evident. Some students have very low IT skills while others are very proficient and self-assured. The teacher and a parent helper, who volunteers her time to assist in the lab, are helping students. When the parent helper approaches one pair of female students who are having difficulty, the student says, "Put it this way, she is worse than me on the computer," and then she laughs nervously. The parent helper inquires what they are attempting to do and suggests strategies for accomplishing the task. The students appear to be at ease and are open to suggestions, but they continue to make comments about how incompetent they are.

Mr. Windsor does not see himself as a skilled IT user, but he does have a computer at home, and he has found several CD-ROMs that fit in nicely with his curriculum. He does not use the lab very often because of the scheduling issue and the fact that it takes so much extra time on his part to prepare and carry out a lesson using IT. He feels he can cover the same material in an equally efficient manner without using IT. Still he tries to include IT in his lessons because he believes that students will need good IT skills if they are to be successful in the world of work.

Money for CDs and other IT related equipment is scarce. Each department is given a meager budget from which to purchase supplies. The overall school budget has remained relatively stable over the past five years. However, the requirements for new equipment and resources have increased. The IT coordinator points out that the cost of a lab of computers is about the same as a teacher's salary for a year. It is impractical, however, to cut staffing with class sizes already close to 30.

By chance a school governor, the equivalent of a school board member in the U.S., is also observing this lesson. He wanders around the room working with students. One of the students asks who he is, and he tells them. They are a little taken aback but readily accept his assistance and suggestions.

The governor explains to me that he is on the curriculum committee for the school, and the committee is focusing on technology this term. This has been prompted by the comments made in the OFSTED inspection that took place during the fall term 1999. Of lessons observed by the inspection team, 12% were deemed to be insufficient due to unsatisfactory teaching. The report also notes that:

Students make sound progress as they move through Key Stage 3 in the information technology 'core' lessons, but overall they make insufficient gains in

their use of information technology in other subjects, in both key stages. By the time they reach the end of Year 11, overall attainment is below the expectations for students of this age, especially in their lack of knowledge of how to apply their skills in all subjects and their unsatisfactory use of control aspects of the National Curriculum....Overall, standards have declined since the last inspection, partly due to the significant challenge of setting up new rooms and updating the quality of the college's computers, and partly due to the lack of co-ordinated will by the whole college to deliver this subject appropriately. Overall attainment is not high enough. (OFSTED Inspection Report, October 1999, paragraph 225)

The governors are doing some observations and have set up a meeting with the IT coordinator, Mr . Hardcastle, to discuss the issues associated with IT use in the school.

The governors are attending staff training sessions and are trying to learn as much about IT as they can. They want to work with the staff in a supportive role to improve IT in the school. The governor explained to me that the government sets guidelines that affect the staff. The role of the governors is then to work in partnership with the staff to get it all to work.

Governors are like a board of directors and make decisions about how the College is run.... Governors are appointed to help: decide what is taught, set standards of behaviour [behavior], interview and select staff, decide how the College budget is spent. College Governors have legal duties, powers and responsibilities. They can only act together, they cannot act individually. (School Prospectus 2000, p. 12)

The Hampshire school governors include parents, teachers, local council representatives, community representatives, and businesswomen and men. The parent governors must have a student in the school and are elected by other parents to serve a four-year term, as do the other governors.

At the same time that the lesson is being conducted in the computer lab section of the library resource room, the head teacher is teaching a lesson to a group of students in another section of the room. The students are gathered around the head in a semicircle and are involved in a discussion. This same area of the resource room is used for after

school homework assistance for students. Students sit at the tables and are monitored by a member of staff who is there to offer them assistance.

Students from other classes wander into the library during the class period to use the books and other reference materials. There are two computers on the side of the library to be used as a card catalogue. When a student checks out a book it is done via a computer.

When the final bell for the school day rings, there is a log jam at the door of the library resource room as the two classes of students trying to exit run into the students who are trying to get into the library to secure a place in the computer lab. A few of the faces are familiar from other break times during the day while others are new. Hotmail and surfing the Internet are the two most popular past times. Three female students are searching the web for information for their geography class, and when they find pertinent articles they print a hard copy. One young man is working on a newsletter, and another is reading something in Chinese. The lab is full for most of the allotted after school time. Although there appears to be little adult supervision, the librarian says that she is supposed to monitor the students, but she doesn't have time and she thinks the students seem to be all right on their own. When one student doesn't know how to do something or needs help, he/she will ask a neighbor. This system seems to work.

A mixture of students come to the lab during breaks and before and after school. Some of them have computers at home. In each session there are a few more boys than girls, and their ages span the five levels of the school. Only a few have good keyboarding technique but they all appear to be very enthusiastic users regardless of their skill level.

By the time the library resource room closes at 5:00, the school day is quickly winding down. Most of the teachers and students have left the grounds. This does not signal the end of the educational day for Hampshire School, however. Adult evening classes begin as the regular school day draws to a close.

At [Hampshire], we firmly believe in the tradition that education is for everyone and is not confined to a particular time of day or age group... The college continues to offer one of the most extensive programmes of Community Education in the county, 86 adult and 40 twilight classes. (School Prospectus, 2000, p. 7)

The community education program offers IT courses on a variety of topics including word processing, publications, spreadsheets, and database managing. The courses are for all abilities. Outside the entrance of the community education wing on a warm spring evening a free standing triangular wooden sign frame has a notice reading, "Interchange and Tea and Biccies [biscuits]. Dinner and Internet in the community lounge."

Earlier this year, Mr. Darby conducted a computer careers evening for parents.

My other role is careers coordinator, and we have two software packages which the children do use a lot. One of them is simply gathering information about careers, but the other is a database, career matching database. They answer many questions on their likes and dislikes, then their computer will come up with a suggested career. I tried that with some parents, and they really enjoyed it. In fact [for] three of the parents it was the first time they'd ever sat in front of a computer and tried it. That highlighted the need for parents to be involved in this process as well. (Mr. Darby, January 2000)

Mr. Darby pointed out that Hampshire School caters to a large multi-ethnic and socio-economic group. Some of the parents have never used a computer while other parents are computer programmers. The community education program is seen as a link for the college with the parents and the community in the area of IT.

Summary

This chapter provided a description of the current educational climate in England, the city in which the study took place, and the school site. The description provided the reader with an understanding of the physical setting as well as the political and structural elements of the setting. The respondents were profiled. Some of the respondents used existing information technology in different ways to accomplish different goals. Given the same setting, other respondents did not use information technology as part of their instructional program.

The descriptions of information obtained from interviews, observations, and artifacts illustrate the differences and similarities in the decisions made by respondents given the same bounded unit. The computer skill levels of the respondents were described to provide a link with their beliefs, motivations, perceived barriers, and use of computers. Elements unique to this particular case were presented.

The next chapter will present my analysis of the data. Conclusions and recommendations follow the analysis.

CHAPTER V

ANALYSIS AND FINDINGS

The previous chapters provide background information and data. Chapter I contains the proposal for the study including its purpose, the research questions, the conceptual framework, and the significance. A review of the literature comprises Chapter II. In Chapter III, the inquiry design that guides this study is presented. Chapter IV contains the case. This chapter presents the analysis of the data and the findings.

Analysis

The analysis of data was an ongoing process. As each interview, observation, and artifact was collected, it was analyzed with respect to the research questions and the purpose of the study. Notes were made to capture my "reflections, tentative themes, hunches, ideas, and things to pursue that [were] derived from [each piece] of data" (Merriam, 1998, p. 161). After each set of data was collected, it was compared with the previous data. This comparison informed the next data that was collected and so on. The on-going analysis enables me to develop a holistic description of the bounded unit. Conveying an understanding of the case is the paramount consideration in analyzing the data.

Keeping in mind that it is the case we are trying to understand we analyze episodes or text materials with a sense of correspondence [consistency within certain conditions]. We are trying to understand behavior, issues, and contexts with regard to our particular case.... We try to find the pattern or the significance through direct interpretation, just asking ourselves "What did that mean?" For more important episodes or passages of text, we must take more time, looking them over again and again, reflecting, triangulating, being skeptical about first impressions and simple meanings. (Stake, 1995, p. 78)

The analysis of the data from this study suggests that there is a complex process that shapes teachers' perceptions and decisions about whether and/or how they use information technology. Teachers' beliefs and perceptions guide the decision making. Other factors that affect their decision making are their personal use of IT, their skills with information technology, influence of the administration, availability and use of resources, and student factors. The metaphor that will be used to describe this decision making process is a series of colored lenses. Each factor has a different colored lens with decisions appearing to pass through several different colored lenses on their way to being translated into classroom practice. The combination of colors when each lens is applied is different for each individual.

Teacher's Beliefs

The first lens is the teachers' beliefs. Beliefs are the attitudes that a teacher has toward students, colleagues, parents, the government, a task, an action, or an event. These beliefs are strong and have a profound influence on how a teacher orchestrates her classroom. Beliefs help the teacher determine the direction she is headed and help her anticipate future events. It is a symbiotic relationship. Beliefs help to form the teacher culture which, in turn, impacts their beliefs.

The teachers of Hampshire School who participated in this study hold strong beliefs that students must be proficient users of information technology if they are to be successful, regardless of their future vocation. "Technology, computers, and things--I can see. I am not a Luddite in the sense that I dismiss them. I can see the importance of IT. I think it's absolutely fundamental to the way we are going. There is no way of getting out of that" (Mr. Pryor, March, 2000). They believe there are multiple benefits to using

information technology. They feel the vast majority of students are interested in IT and want to use it at school and at home if they have access to it. "I think for pupils there is a huge incentive and pressure to be familiar with IT for career reasons and financial reasons.... They can't be fully functioning members, or stakeholders if we can use that word, of society unless they are able to access information in that way" (Mr. Darby, January, 2000). The lack of IT skills is equated with the gravity felt if someone lacks the ability to read. A concern is expressed regarding the divide emerging between the students who don't have or use computers and those who do.

It's a huge factor, accessibility. Significant numbers of children who have got very sophisticated pieces of equipment at home and those who do not. Significant numbers who do not, we are creating a new class structure between those who have and those who don't. (Mr. Darby, February, 2000)

Teachers see the school as an important mediator to ensure that every student becomes IT proficient. Belief in the importance of IT in the lives of students influences the teacher's decisions regarding IT as part of their instructional program.

Despite this strong belief in the need for IT, another umbrella belief has a much more profound effect on how information technology is integrated into the culture of the school. The teachers at Hampshire School believe their school must follow the dictates passed down from government ministers in London regarding the use of the national curriculum, the code of right and wrong set up by the Office of Standards in Education (OFSTED), and the decree by government that technology should play an important role in the life of every school.

Changes that have taken place in England in a very short period of time that have affected teachers' decisions include the introduction of the national curriculum, compulsory performance appraisal to regulate teachers' methods and standards, and the

shift to local management of schools in order to make them more responsive to market forces. Local management of schools is not proving beneficial because funding is scarce and bureaucratic control over curriculum and assessment has been retained at the national level.

The accountability system, OFSTED, and GCSE grades are at the heart of the organizational and structural systems at Hampshire School. The national curriculum dictates what courses must be offered and at what level. The OFSTED inspection regulates how the school is organized and the quality of the teaching. The GCSE results are a public measure of the quality of the school as a whole (Field Notes, January, 2000). "At the end of the day, if the GCSE results are poor, but the children's IT skills are excellent in it, the members of staff will get obliterated, disciplined, [or] lose their jobs. [There is] a lot of problems. Market force is about GCSEs" (Mr. Hardcastle, February, 2000). Ms. Chamberlain points out that, "We are judged by our exam results. We have to train the pupils to pass exams, but at the same time we are trying to train them to think" (February, 2000). "In a GCSE class, what they need to know is how to answer an exam question within 25-30 minutes, and my planning will go into that" (Mr. Windsor, March, 2000). Mr. Windsor goes on to say, "That's the way it is in an exam, including the way the questions are phrased in the exam. They are all sitting in the same exam. They are all asked about the same [content]". The scheme of work [curriculum], if it is properly taught, is designed to enable students to get good grades in GCSEs, not to be good at IT in those subject areas. When the national curriculum was introduced in 1988, information technology was seen as a peripheral course that was second to foundation course

requirements such as history. In the reassertion of traditional academic subjects in the national curriculum, Goodson, (1990) points out that:

the balance of subjects in the national curriculum suggests that questions of national identity and control have been pre-eminent, rather than industrial or commercial requirements. For example, information technology has been largely omitted, whilst history has been embraced as a "foundation subject" even though it is quite clearly a subject in decline within the schools. (p. 221)

The strong emphasis on the teaching of British history in the wake of the decline of the nation state and the rise of globalization is an attempt by the government to reconstruct the British culture and traditions through the education system. The emphasis on the foundation subjects and the rise of the importance of information technology has set up a paradox. IT is still a course of its own. However, the government's insistence that teachers continue to achieve high GCSE scores on foundation courses and also make information technology an integral part of the whole is causing a great deal of stress for the school and its teachers. This in turn affects the perceptions and decisions of teachers.

"In the real world [students] need this exam [GCSEs] in order to get on" (Mr. Windsor, March, 2000). Grades on the exam, like grades on a report card in America, are critical factors in the determination of whether students go on to higher level education and at what school. The student's economic future is tied to their GCSE results and this in turn molds the organization and structure of the school (Field Notes, February, 2000).

The belief in the significance of GCSE grades permeates the whole of English society, not just the culture of Hampshire School. It is believed that given a choice of schools, parents will opt for schools with good GCSE scores. The school and its teachers are seen as the pivotal agents in determining the futures of children. As the national government has proclaimed, "Poverty is not an excuse" for low grades on GCSEs. This belief about who is responsible for students' success is the life-blood of the culture of

schooling in England and in Hampshire School. This belief has a profound effect on the decisions made by teachers about the importance they place on the use of IT as part of their instructional program.

It appears that the goal of achieving high scores on GCSEs is on the opposite side of the scale from the goal of increasing the use of IT in schools. Both require a significant commitment of resources including time and money. On the one hand the GCSE scores hold significant weight when the quality of the school and the quality of the students' education is determined. On the other hand, teachers believe that IT skills are critical life skills. Coupled with this, the connection between the use of IT and improved scores on GCSEs is weak. "What is the relevance? How can he or she deliver the subject more effectively [using IT]?" (Mr. Darby, January, 2000). The result is that IT does not bear enough weight to offset the importance of GCSE grades. Even though the use of information technology is seen by teachers to be a critical life skill, at Hampshire School the GCSE scheme of work connected to getting good grades significantly outweighs the use of IT as an important component in the instructional program.

Figure 2 illustrates the relative importance of GCSE scores and the use of information technology. The quality of the school and the quality of the students' education are being measured by GCSE scores because high scores are seen nationally as a determinant of success beyond secondary school. This precept is advertised locally and nationally which in turn reinforces the importance of GCSE scores in the minds of teachers and stakeholders within the community. On the opposite side of the scale is the belief by teachers that information technology skills, like reading, are critical life skills. The government is trying to change this balance by dictating the inclusion of IT. The

GCSE scores and IT will continue to be out of balance as long as the emphasis is being placed on the GCSE scores or until IT is shown to be a way to increase the GCSE scores.

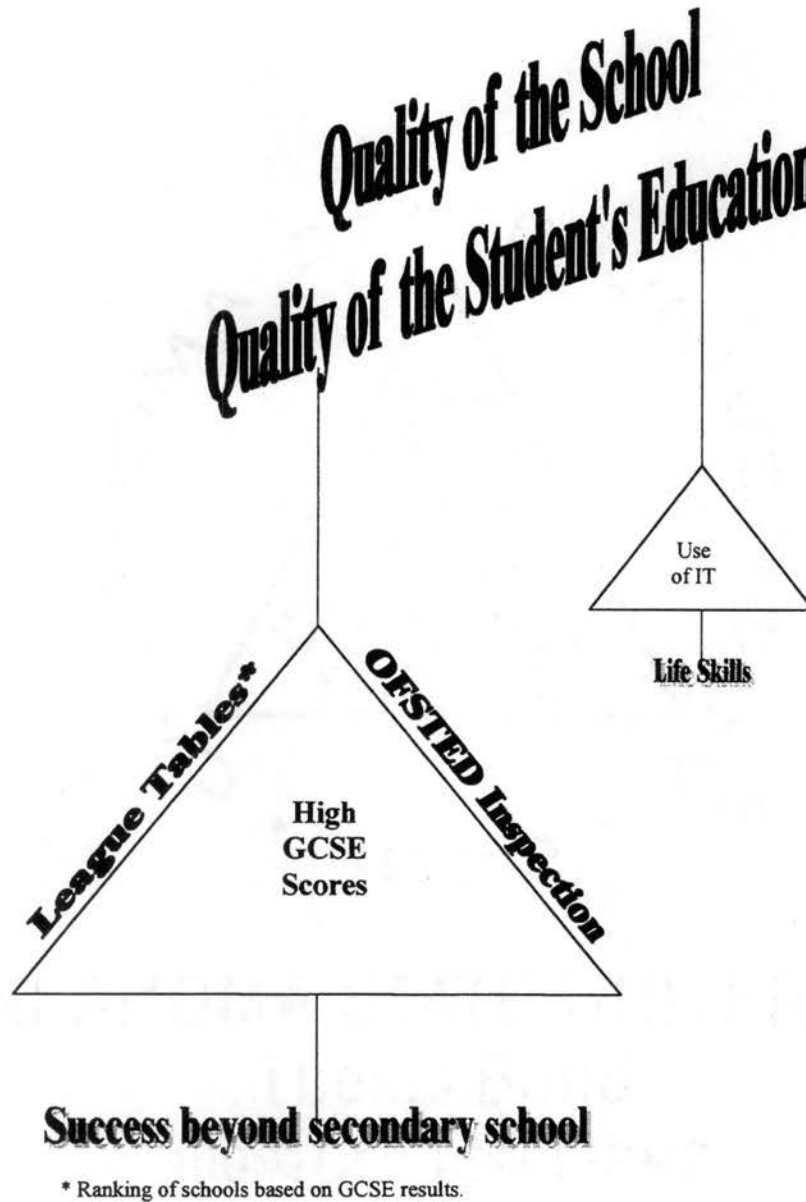


Figure 2. Relative Importance of Beliefs

The balance between the importance of focusing the instructional program on the attainment of good GCSE grades and teaching or using information technology in order to achieve a quality education program as defined by OFSTED.

Because of the importance being placed on the attainment of high GCSE scores, the organization and resources of Hampshire School are focused on high GCSE scores, not the acquisition of IT equipment or the attainment of proficient IT skills for all students. The teachers are confused and frustrated. "I don't think that people have got enough willpower either in schools or nationally to invest in IT. I don't think the focus is actually there at all. People are still confused as to how can we use this thing [information technology] in our lessons. I don't think schemes of work and the curriculum have actually caught up with IT" (Mr. Windsor March, 2000).

According to the OFSTED report, there is a "lack of co-ordinated will by the whole college to deliver this subject [information technology] appropriately" (October 1999). This has increased the pressure on the school as a whole to change the way they are doing business with regards to IT. However, "awareness [of the programs and need for more IT] in itself isn't enough. You can be aware of something and yet not do anything about it" (Mr. Darby, January, 2000). There is little in the culture of schools or in Hampshire School that is changing systematically in order to address the imbalance between the GCSE grades and the use of information technology.

Teachers at Hampshire School feel that the demands being put on them by the government have increased to the breaking point. Over the years, their duties and class sizes have increased and so has their stress level. In an article by Dan Grimmer in the local newspaper in March, of 2000, "Teachers are suffering from alarming levels of stress and depression, according to new research. Overwork, unruly pupils, conflict with colleagues, and the pressure to perform in OFSTED inspections all contribute to increasing unhappiness among the profession" (Grimmer, 2000). The article goes on to

say that, "the rapid rise in educational change, coupled with increasing pressure and rising expectations are evidently taking their toll" (Grimmer, 2000). The stress level is high for everyone. "I've spent 25 years and not had a break. That can be said for most of my colleagues and that is something that needs massive investment in. We're under valued, under resourced, under looked after, under everything"

(Mr. Hardcastle, February, 2000).

The belief lenses through which the teachers look create a paradox for them. On the one hand they believe that high scores on the GCSE are critical to the success of their students and to their own position as a teacher. On the other hand is the strong personal belief that IT, like reading, is a critical life skill regardless of the government's push for the inclusion of IT as integral part of instruction. The analysis of the data from this study will continue to show that the two beliefs color the perceptions and decisions of teachers as they move through the other complex factors that affect their choice to use information technology as part of their instructional program.

Personal Use of Information Technology

For teachers at Hampshire School, having a computer at home does not directly translate into a decision to use one at school. The teachers in this study all have at least one computer at home and use them for a variety of purposes including surfing the Internet, talking with former students, colleagues and friends, participating in chat room discussions, typing coursework, shopping on-line, using CD-ROMs, or for collecting dust. Mr. Darby describes his own regular use of his computer over a period of years as a tool for completing course work. The computer simplified his degree work and saved him considerable time. Teachers also describe how their families use the computer. Mr.

Windsor's partner uses the computer to chat with her elementary students outside the duty day. Ms. Chamberlain is married to a scientist who has used a computer for years as part of his job. Teachers with children describe their children's interest and skill in using the home computer at very young ages, and they see how computers are an integral part of their own children's lives. Mr. Pryor has a computer at home but only uses it occasionally. It is an old and slow computer, and, because of personal financial reasons, he has been unable to purchase new equipment. Mr. Pryor is very interested in the new government scheme to give teachers a £500 rebate on any computer they purchase at a cost of £1000 or more. He feels this would affect his personal use of the computer as well as his colleagues who can also take advantage of this offer. However, he does not feel that the availability of a personal computer will have an impact on his use of IT at school with students. Mr. Windsor explains, "I know things [IT programs] I use personally, and there are things that we can share and use together. But I don't know [about these programs]" (Mr. Windsor, March, 2000). Ms. Chamberlain who is an avid user of IT at school expressed confusion as to why some of her colleagues who have computers at home and use them on a regular basis show little or no interest in using them at school.

At first glance, teachers appear to be looking through the same colored belief lens that IT is important for all students to learn if they are to be successful in life. Their personal interest in and use of IT, however, affect the choice of all subsequent lenses. Coupled with these are several organizational, structural, and personal lenses that change the decision making process and make it a highly individualized one.

Having good personal skills with IT does not necessarily mean that a teacher has the skills to use information technology as a teaching tool or to integrate IT into her/his

current instructional program. Further to this, having the appropriate computer skills does not mean that the teacher is convinced that using IT enhances students' scores on their GCSEs. These reasons are, in a sense, a lens through which teachers look when planning their instruction.

Decisions regarding the use of IT as part of the instructional program are affected by the teacher's instructional IT skills, time to learn appropriate skills, time to prepare lessons using IT, availability and convenience of IT equipment, and perceived connections between the use of IT and the curriculum. Each lens will be discussed in turn.

Teacher's Skills

The skills which teachers need in order to incorporate IT as part of their instructional program are not dependent on their beliefs about teaching and learning or how they view the role of IT in the instructional process. There appears to be little congruency between their visions of an ideal classroom, their style of teaching, and their beliefs about teaching and learning.

Teachers describe their teaching styles on a continuum from being very being didactic in nature to being a facilitator espousing constructivist ideals. "In a perfect world, you'd wish for perfect control" (Mr. Windsor, March, 2000). Mr. Hardcastle is on the opposite end of the continuum because he believes that, "It's the idea that you [as the teacher] are the facilitator, rather than an expert..." (February, 2000). A didactic or constructivist belief system did not correlate with the level or method of information technology used by the teacher.

Unreliability of equipment and software in the computer labs is a problem for all, regardless of their IT skill level. Teachers who do not feel comfortable with instructional IT skills and managing students in a lab setting feel uncomfortable because of their lack of control. "It's a matter of familiarity, and it is so frustrating when a simple thing happens and you can't get the screen to shift. It's stuck there and you have to call the IT manager to come and do it" (Mr. Pryor, March, 2000). Teachers want control of the process, the management issues, not necessarily the content. Teachers whose emphasis is on teaching the students how to approach and manipulate new information are just as uncomfortable with using the IT lab as those who feel they are the expert and need to control the content of their lessons. The IT labs are seen as an alien environment because they are relatively new and contain unfamiliar equipment.

The OFSTED report indicated that the,

...standards have declined since the last inspection, partly due to the significant challenge of setting up new [IT] rooms and updating the quality of the college's computers, and partly due to the lack of co-ordinated will by the whole college to deliver this subject [Information Technology] appropriately. (OFSTED Inspection Report, October, 1999)

The report prompted the school to increase the amount and variety of training opportunities in information technology for teachers (Field Notes, February, 2000).

Teachers' reactions to the training schemes are very individualistic. "Fundamentally it's very dangerous not to do what OFSTED says. Already the school is making big efforts to engage people like me. I've already been off to two or three courses... [on how] to use various aspects of computers. I expect that will be ongoing" (Mr. Pryor, March, 2000).

Teachers who have minimal skills are being given the opportunity to learn basic skills during "Twilight Training" courses (Field Notes, February, 2000). Mr. Pryor notes that he will be in dangerous territory if he doesn't pursue the training and yet, he doesn't feel like

the possession of a new computer or the training will change the way she teaches. An incentive to pursue further training for some teachers has been the rebate on the purchase of a new computer. To qualify, the teacher must be involved in a training scheme (Field Notes, March, 2000).

Mr. Windsor explained, "My training has been very minimal.... There is a training programme [program] here and I haven't been involved yet. That is not the school's fault; that is my fault because the course has been on offer. I know this is an ongoing thing. I can jump in at any time and do that" (Mr. Windsor, March, 2000). In sharp contrast, Mr. Windsor does not feel the pressure expressed by Mr. Pryor. He will get involved in the training when he wants to. Mr. Pryor is also an avid user of the computer at home but has very little knowledge about what programs or how computers can be used as part of his instructional program.

"I have enjoyed the afternoons or the days that I have been doing the training sessions, but it hasn't actually resulted in any action, or very little" (Mr. Darby, February, 2000). Mr. Darby has been enjoying the training but states that the training has had very little impact on his instructional program so far. He is an experienced user of information technology at home but uses IT infrequently at school.

Training sessions are voluntary. The teachers did not express feelings of pressure being put on them by the head teacher, their department heads, or the governors to join a training scheme. The pressure came from the perceived importance and consequences related to the OFSTED report.

The teachers feel it is important to make "...learning enjoyable...exciting to the kids and getting things that interest them" (Mr. Hardcastle, February, 2000), regardless of

whether the lessons take place in the classroom or while using computers. They have experience in creating these attributes as part of their lessons in the classrooms, but in the computer lab they do not. Instructional skills that will assist teachers in planning for and managing IT labs are not being addressed (Field Notes, February, 2000). The emphasis in inset (inservice) is being placed on learning skills such as word processing, spread sheets and data bases, and exposing teachers to programs and Internet sites that can be used in conjunction with their programs. However, there is no indication from the teachers, observations, or the collected artifacts that the needs of the teachers in learning how to manage instruction using IT in a lab are being addressed (Field Notes, February, 2000). The issue of control vis-a-vis management is a prominent issue in the decision making process.

Teachers recognize the importance of addressing the myriad of learning styles presented to them by their students and see IT as meeting only part of this requirement. Teachers who have been in education for a long time see that one of the greatest changes is having to share their rooms with other professionals who are there to assist particular children. My observations of lessons confirmed this (Field Notes, February & March, 2000). Teachers stated that IT is only one of large variety of instructional strategies that is available to try to meet the needs of their diverse population. They see only a slight change in education as a result of the introduction of IT.

Influence of the Administration

The administrative structure of the Hampshire School is flat in nature as opposed to hierarchical in the American system. The principal is the head teacher, and, as such, she is the leader of the school and also a teacher which puts her on a par with the rest of

the faculty. Her leadership in the area of IT development within the school is seen as being very important. "The role of the head is obviously pivotal. She plays a very important role in the college as a whole, and how far we get will in some way depend on what role she plays" (Mr. Darby, February, 2000). "It's vital that the senior management team has got a strategy and appreciates a three to five year strategy....They know if they don't invest in technology, parents are not going to send their kids to this school" (Mr. Hardcastle, February, 2000). "[The head teacher] is absolutely fundamental" (Mr. Pryor). Teachers see the role of the head teacher as being important. However, they did not express any feelings of pressure coming from her nor any specific guidance on how they were to accomplish the goal of integrating technology into their instructional programs. The absence of these remarks might account for the OFSTED comment on the lack of a school-defined commitment to information technology and the lack of a future plan for how it will be approached (Field Notes, February, 2000).

The school prospectus, the comments made by a school governor, and the teachers all indicate they see the role of the governors as a partnership in the education process. Mr. McGrath, a school governor, described his role as one of, "supporting, guiding, and cajoling". He went on to say that the "government sets guidelines which affect the staff, and then the governors work in partnership with the staff to get it all to work" (Mr. McGrath, February, 2000). The governors are there to help and support the school to achieve its goals, not to direct the course of action.

During the three-month course of this study, the governors, who are part of the curriculum committee, were making classroom observations and consulting with members of staff to obtain a picture of the current use of information technology at

Hampshire School. They were collecting this information in order to find ways to address the OFTED criticism and to help the teachers with the integration process (Field Notes, February, 2000).

The heads of department are seen as facilitators of their department's business. The department head's skill and desire to use IT did not appear to affect the members of the department either way. "Our head of history admits quite happily she is not comfortable with computers" (Ms. Chamberlain, March, 2000). Ms. Chamberlain, on the other hand is an avid user of IT. The head of the geography department uses IT in the classroom on a regular basis; Mr. Pryor, a geography teacher, does not. Mr. Windsor from the English Department said, "I think people in our department are highly skilled, but our focus has more to do with literacy than with IT. That's the current watch word" (March, 2000). This statement about literacy again expresses the conflict between the government's emphasis on a foundation course of the national curriculum and the use of IT.

Several departments have made a group decision to pursue a particular type of training (Field Notes, March, 2000). For example, the history department has joined with the historical society to expose teachers to software that can be used in their lessons.

The local branch of [the historical society] runs training for history teachers. So not only do they train you on the nuts and bolts of how to do it, the program and the things you are using are to do with history teaching at the two levels that we teach here, the key stages. So we have chosen what level we think we are at now...and then we will be allocated a tutor on-line which we do work with, send work to, and get it back. It will be planning lessons as well as using history programmes that are out there. CD-ROMs and things are there, so we can develop our skills to a certain level within the subject. So we are not just doing extra work; we can actually use it to plan our lessons that we are using in the day. (Ms. Chamberlain, February, 2000)

Ms. Chamberlain touches on the perception that time is a key lens that teachers look through, a subject that will be discussed under the topic of resources.

Teachers were firm in their conviction that the utility of IT as an instructional tool varies depending on the subject area. "There are certain subjects where it [information technology] is of more use, more applications, technology, sciences, English" (Mr. Hardcastle, February, 2000). Ms. Chamberlain uses IT more frequently with two of her instructional areas than the third, which is history. She sees the applicability as being different depending on the subject. Mr. Darby sees the subject as being important in her decision making process on how to use IT as opposed to the issue of whether or not to use IT at all.

In music... I would use IT to help compose it, to help with the notation, to help create sounds and record music as well and to mix different sounds together. In history I've used it in a different way, in finding out information, using CD-ROMs for information and looking at sources and also to try to help pupils structure ideas, and develop their conceptual thinking when doing extended writing. (February, 2000)

As the accountability factor increases with the OFSTED evaluations, so too does the capability to analyze data and keep administrative records for documentation.

[T]here was a time when we just used to teach. Now we've got lots and lots of paperwork that goes with it. For whatever reason, the governments decided that they were going to improve education, and they decided to improve it by making us tick lots of boxes so we had to start justifying what we did. (Ms. Chamberlain, February, 2000)

The heads of each year group all have computers in their offices that are connected to the main office. The primary use of these computers is for administrative purposes such as attendance, recording test scores, and recording information that can be used to support OFSTED criteria (Field Notes, March, 2000). "It's horrid being inspected, and it causes a lot of unnecessary work as you have to fill in so many forms for the inspectors" (Ms.

Chamberlain, February, 2000). Teachers are feeling the increasing burden of paperwork for the job. Their first response is to use their computers to lighten the accountability load, not to use it as an instructional tool. "They've actually started to find that the administrative side is quite easily handled by computers. So I think in the end, ultimately, all the departments will start to use it more as an administrative tool" (Mr. Hardcastle, February, 2000).

We are starting to try to produce databases more and use them [the computers] instead of all this hand-written stuff all of the time when we are rewriting things. I have actually got a package which the governor has bought me. It's a database for me to list all my special needs pupils on and the stages they are at and their problems. It produces IEPs for me. It produces letters home to parents for annual reviews and things like that. I find that very useful. (Ms. Chamberlain, February, 2000)

The amount and variety of training options are increasing. However, the carryover to actual implementation appears to be limited. The department heads, the heads of year groups, the head teacher, and the governors all appear to have little influence on the teachers' decision making process. The OFSTED report appears to play a more pivotal role than the school administration. Teachers see the applicability of information technology to various subject areas as being different. They are using information technology to assist them with their administrative duties that continue to increase as the requirement for accountability increases.

Resources

Teacher's Visions

When teachers were asked to describe an ideal classroom, they included more and easily accessible IT. "I'd knock most of the school down because we are living in a 1930s building. I would have certainly bigger classroom areas, so that the furniture was able to

take kids easily, and there were totally networked facilities throughout the system" (Mr. Hardcastle, January, 2000). "I would like to see children with laptops, and with much greater access to information communication technology.... I would like to see in the arts much greater use of technology, use of video, and film studies" (Mr. Darby, March, 2000). Ms. Chamberlain describes her vision as, "Something like an electronic board and possibly a partitioned room, maybe with a glass front, where some pupils could go so I could still see them and where they could still feel part of the group but where you have a bank of computers" (March, 2000).

Along with the vision came a sense that no matter what they envisioned it probably wouldn't happen, or at least not within the next five years or so. "Certainly technology [is] everywhere, and we're not going to get there" (Mr. Hardcastle, January, 2000).

Mr. Darby envisioned a school with computers everywhere. Along with the equipment would come a change in teaching and learning. The computer would work for some students in a home environment while the rest of the students continued in the traditional classroom setting.

Can I say also that would result in children working at an even greater pace, different paces. If children can access [IT] like the invention of the printing press and [the] impact that [it] had on peoples learning and literacy levels.... It might mean that if children's preferred learning style is to work on their own at home, they may develop a much wider knowledge base a lot more quickly than they would in a class setting. (Mr. Darby, March, 2000)

Mr. Hardcastle went one step farther and envisioned a technocentric school that had little resemblance to the current school structure and format.

In their ideal school there would be lots of IT resources including computers, wipe boards, and connectivity to the Internet. A purpose built facility to accommodate the

equipment is a prominent feature in their vision. Teachers see the possibility of altering their current teaching style if they have IT resources available in their classrooms. One alteration in their teaching style is to have smaller groups working on different tasks at the same time. A bank of computers in the classroom will enable one group to use the equipment while the other students are engaged in another activity.

For the teacher who sees the possibility of a technocentric school, the curriculum of the future will be directed by the technology, not the reverse. Today, the scheme of work is designed to enable students to achieve good grades on GCSEs, not to be good at IT. The current curriculum has confined IT to its own space and time and does not promote IT integration into other subject areas. A vision or belief in what the future can hold guides the decision-making process. The belief that IT is an add-on to the current curriculum colors the decisions made by those who view the future through this lens.

Financial concerns, the scheduling procedure, availability of good equipment, and time are the four main resource lenses through which the teachers look to make decisions about the use information technology. They all have the same lenses but see the possibilities differently depending on their objectives. Teachers who are interested in using the Internet are concerned with the capability of computers and the speed of the connectivity. Mr. Hardcastle was excited about the prospect of the new microwave link for the Internet because it would increase the speed and capability of access. Teachers who want to use word processing expressed concerns about students' skills with the program and the number of computers that were up and running. Ms. Chamberlain wonders how she will be able to purchase new software with her meager budget.

Finances

The actual problem that we have is funding....[W]e've had to keep upgrading the equipment and that's down to resources. [Hampshire] is the second, maybe the worst resourced authority in the country....So you have schools down the road, one is in [Hampshire] and the other is in Hertfordshire and the same sized school, and one gets £350,000 more money a year to run the school than the other. It's significant and the government under funds Hampshire based on the fact that it's agricultural....Their arguments dumbfound us, but there still is no money. (Mr. Hardcastle, February, 2000)

The population and funding for the school has remained fairly stable over the past ten years but the demands on the available funds have continued to increase. The proportion of the budget used for information technology has continued to increase (Field Notes, March, 2000). The consequence to the rest of the school is an increase in class size to compensate for lack of funds to hire more teachers to meet the requirements of the national curriculum. To reiterate, Mr. Hardcastle pointed out that the cost of a suite of computers is about equal to the salary of one teacher for one year. With class sizes already 30 or above, it does not seem to be a prudent decision to further reduce the staff size in order to purchase equipment.

Hampshire School entered the computer arena with the purchase of Acorn computers because of the cheapness of the equipment and software. Several years ago they decided to make the switch to PC's which involved a major purchase of computers and software and the retraining of staff. There is now pressure from the OFSTED inspection, students, and parents to purchase more up-to-date equipment. Not of interest to the students are the 486's because they cannot handle the new software or fast access to the Internet (Field Notes, February, 2000).

An important issue at the moment in England is the cost of Internet access. The English phone system has an escalating fee schedule for all phone calls including local

calls. This is similar to the fee schedule used for long distance calls in the United States. The longer you stay on the line, the more the call will cost you even if it is a local call. Hampshire School will soon be given a microwave link that will increase the number of computers that can be on-line and the speed of the access. The cost has been minimal because the school is at the same altitude as the county offices. The cost to the school will only be the antenna to receive the signal. However, the link is only as good as the computers it is feeding (Field Notes, February, 2000).

The cost of training must also be taken into consideration. Government and lottery funding sources are being used to augment the meager coffers of the school. However, this will continue to be an issue as new computers and new software become available (Field Notes, March, 2000).

Security costs for the computers and the furniture upon which they are placed also drains financial resources. Keeping the computers up and running along with printers and other peripherals are added expenses. One staff position has been given for a computer technician. The IT coordinator is responsible for IT as well as maintaining a full time table of her own classes (Mr. Hardcastle, February, 2000).

Money available to support information technology is hard to come by, and the lack of funds impacts on the decisions made by teachers. With limited financial resources there is limited equipment, capability, and support which in turn affects the decisions made by teachers.

An individual issue for teachers is their own "sellability" in the job market. An examination of the Times Educational Supplement which each week lists teaching positions available around the UK, reveals that schools are now asking for IT

qualifications (Field Notes, February, 2000). "There are financial incentives [for learning about IT]. There will be career incentives. I think it will become increasingly more difficult for teachers to pursue a career unless they have the necessary skills in IT" (Mr. Darby, February, 2000).

Scheduling of the Labs

A main resource issue that affects all teachers is the scheduling of time in computer labs. Teachers must schedule several weeks in advance if they hope to find three or more consecutive class periods that are available. This becomes a game of scheduling roulette. "[T]here is a time tabling question. You've got five or six classes in each year group and there are three rooms. You can't exactly [accommodate]... everybody. Plus there are IT lessons going on every day. It's kind of difficult" (Mr. Windsor, March, 2000). The teacher has to predict when she/he will need the lab. Teachers sign up for the required number of class periods if they are not already being used by IT, business or key skill classes (Field Notes, March, 2000). When the day finally arrives to use the lab, the teacher must use the lab regardless of the fact that she/he may not be ready for the lesson on that particular day. "[A]ctually getting time in an IT room to correspond with the moment you have them in the timetable, although we have three rooms now, is virtually impossible" (Mr. Pryor, March, 2000). It is always a gamble as to how many machines will be in working order. Barring any complications up to this point, the teacher must then deal with the varying skill levels of pupils in using the computers. Some of them will have skills far beyond those of the teachers while others barely know how to turn on the machine. This scenario puts off many teachers. The number of different teachers who sign up to use the labs evidences this (Field Notes,

March, 2000). To circumvent many of these issues, a strategy put forth by one of the teachers was to complete all the necessary lessons to cover the scheme of work (curriculum) and then schedule the IT lessons. Mr. Pryor sees the use of the Internet as a great way to enhance the geography units, but the obstacles appear to be too great to overcome so he doesn't sign up for the lab very often. Ms. Chamberlain readily uses her own mini-lab for special needs students and the school lab for key skill classes. Her history classes only use the lab once in awhile. Mr. Pryor uses the lab on occasion to have his students complete work using a word processing program. Very few of these students have adequate keyboarding skills so the lesson takes three times as long to do in the lab as it would to have the students just write out their paper (Field Notes, March, 2000).

Availability of good equipment

[T]here has been an issue with resources. There hasn't been a computer suite necessarily to use or there haven't been the networking facilities for CD-ROM....It has only recently been possible to take a whole class and even now in the room that we're in there are not enough computers, about 15 or 16 computers. If you have a class of 32 that means collaborative work which may be absolutely fine, but it may not be the ideal model for that particular CD-ROM. So there are resourcing issues certainly. (Mr. Darby, February, 2000)

The number and type of computers that are available is one issue raised that affects a teacher's decision to use information technology. Even if the computers and programs are in the lab, the issue of equipment failure and the teachers' lack of ability to deal with it is a major factor. When a computer breaks down,

[T]he children don't know [how to fix them] and my own personal knowledge is not very strong and therefore I don't feel in charge when I'm taking the students to the lab...That's because I've never had any proper training and I never have time to properly learn. (Mr. Pryor, March, 2000)

Unreliability of equipment and software in the computer labs is a problem for all, regardless of their IT skill level. Teachers who do not feel comfortable with instructional

IT skills and managing students in a lab setting feel uneasy because of their lack of control. Teachers who experience equipment and software problems shy away from using the labs. Their bad experience colors their decision making.

Time

Time consists of more than one closely linked lens. Time to complete the job of teaching the scheme of work as it is currently defined, without bringing in IT, is the first lens. Time to learn IT skills, time to plan for new lessons, and time to conduct the lesson represent separate lenses that in turn color the decisions teachers make.

When it is suggested that the teachers take time to learn new skills or take extra time to plan lessons incorporating IT, they begin to balk. "I do feel sorry for the staff. The staff has had to take on this computer revolution without being given time" (Mr. Hardcastle, February, 2000). Adding financial incentives helps for some. Having time to do the training and planning as part of their regular instructional day is seen as a way to ensure that everyone gets trained and that there is time to be trained properly and to plan effective lessons (Ms. Chamberlain, February, 2000). Even with this training, there is no assurance that teachers will automatically start to incorporate what they have learned in the inset (inservice) training with their instructional program. As Mr. Darby points out, "I have been doing the training sessions, but it hasn't actually resulted in any action, or very little" (Mr. Darby, February, 2000).

The school does not have the financial resources to buy the time teachers require. Funding from outside sources has helped, but is not adequate to meet the immediate needs of teachers who are having to use some of their own time to learn these new skills

(Field Notes, February, 2000). They don't like this as it is infringing on limited family and personal time.

You are expected to do your teaching, your administration, and learning new skills in the same time as you always had. That's tricky. It means life is much more stressful. I'm very tired when I go home in the evening....I've had to be very strict with myself. I go home at the end of the day and I make sure that I have family time, no school things...I can't do everything. Even though I think I should be, I don't. I'm determined it's not going to become a way of life for me. I've seen lots of teachers go under actually, over the years. They just can't cope. (Ms. Chamberlain, February, 2000)

For teachers who have adequate skills to plan and carry out lessons that involve IT, there is the added difficulty of finding time within their instructional program to conduct lessons in the lab. Teachers, speaking from their subject area vantage points, emphasize that a lesson incorporating the use of IT will take significantly longer to conduct than the same lesson without the use of IT.

I feel that I can reach my end point much more efficiently, to a large degree, as I always have done without technology...[H]owever, using computers as such, because of the time constraints, I am very uneasy using it. It is very time consuming. (Mr. Pryor, March, 2000)

Covering the scheme of work (curriculum) in a satisfactory manner generally takes more time than is currently available. "We have the specific GCSEs and there is an amount of time allocated in the curriculum so that you can teach those GCSEs. I think there is a feeling that if there is a large learning curve with the IT, then you are taking away the subject time" (Mr. Hardcastle, February, 2000).

IT is viewed as an add-on that takes a lot of time. The teachers have difficulty fitting IT into the instructional program because of their skills or lack thereof, availability and accessibility of resources, and the lack of time. For some teachers, the multiple lenses through which they view their decisions to use IT are clouding their view. Others are still able to see beyond these obstacles and make their decisions accordingly.

Student Issues

Although student issues are tightly woven into the fabric of the teachers' decision making process as seen in the previous discussions, it is also important to examine them as an issue unto themselves for the sake of clarity. The availability and desire to use information technology, the importance of IT in their lives, and their skills are the main issues tied to teachers' decisions.

In the interviews, the teachers estimated that around 60-70% of the students at Hampshire School had access to a computer at home. Even with this percentage, teachers were reluctant to make assignments that required the use of IT because they felt the facilities at the school and the time available in the library resource lab for the students outside of instructional time was not sufficient (Field Notes, March, 2000). Mr. Pryor said he thought it would be possible but, "They'd have to manage it very carefully. It would be a knife edge I'd have thought, difficult for them" (March, 2000). In looking at the student work in classrooms and on the display boards in the hallway there was a combination of hand-written work and computer generated documents in every department (Field Notes, March 2000). Teachers allow the students to hand their work in using either format. However, students are not assigned a project or paper to do on their own that requires the use of information technology.

The work I've described for year eight, a lot of it is done at home. Their final examination is composed of two written papers, and a piece of course work which is worth 25% of their total marks. They can use as much IT and word-processing, whatever they want to do, as much as they wish, [including] graphs, [and] tables. (Mr. Pryor, March 2000)

The skills learned on a home computer are not necessarily a match for those required at school. Mr. Darby asked his students if they were familiar with the computer program he is planning to use for a future lesson.

[O]nly a third are, so I'm going to have to look at ways of training them because the IT might actually get in the way of that particular project. So there is a kind of reluctance sometimes as well which one doesn't feel terribly comfortable with oneself. (Ms. Darby, February, 2000)

Students' skills with a particular program affect the teacher's decision to use it. If he decides to use the program, he must also teach students how to use the program in order for the lesson to be successful. The situation is further exacerbated by a large variety of skill levels of students in general and their differing levels of confidence.

Some didn't want to know, but most of the pupils went straight to the computers, sat down, were very confident, came up with the answers very quickly... Others sat by the books and didn't want to know. Others had no idea. It's dangerous to draw too many conclusions, but certainly those who seemed less confident, you would certainly put down as from lower socio-economic groups. (Mr. Darby, February, 2000)

The suggestion is made that there is a socio-economic divide between students who have computers at home and those for whom computing is something which is just a school based activity. However, Ms. Chamberlain contradicts this assumption by pointing out that,

Even the children who come from social backgrounds where perhaps they can't afford a computer at home are very keen to get on them here. They want to keep up with it here so they are the ones who often stay behind after school or come in a lunch time, break time, and want to use any computer they can get. It does amaze me sometimes how confident and competent they are at doing things even though I know that at home they may not have access to that....They are hooked. (February, 2000)

Teachers believe that students are learning more of their IT schools at home than at school. Regardless of the reason for the discrepancy in skill levels and desire to use the

computers, this is an issue that teachers must take into consideration when making instructional decisions.

Another factor that teachers must take into consideration is pressure exerted by students on teachers to use IT. Mr. Hardcastle feels there is a strong desire by students to use the computers and that this pressure impacts on the teacher's decision making process.

[C]hildren are demanding to go to the computer room. They've learned computer skills and the computer room is there so they're asking why they can't go in there because they enjoy it. They enjoy using the computers so they put pressure on staff who are not using them. The staff can either say, well I don't feel happy about it and get a bit of stick from the kids or get pressurised [pressurized] to start thinking about using it. (Mr. Hardcastle, February, 2000)

The availability of and desire to use information technology, the importance of IT in the lives of the students, and their skills are the main student based issues tied to the teacher's decision making process. Although teachers may not consciously take these factors into consideration, these three lenses do color the choices they make.

Findings

Introduction

The conceptual frame provides the disciplinary orientation that I draw upon to situate the study. It identifies what aspect of the topic is going to be the main focus. The conceptual frame guides the research process in terms of defining what is important to know about the topic, how to define the problem, the precise purpose of the study, data analysis techniques, and the interpretation of findings (Merriam, 1998).

Findings

According to Stake (1995) a conceptual frame is a way to express big ideas or themes that give focus to a study. The conceptual frame,

Draw[s] us toward observing, even teasing out, the problems of the case, the conflictual outpourings, the complex backgrounds of human concern. [The conceptual frame] helps us expand upon the moment, helps us see the instance in a more historical light, helps us recognize the pervasive problems in human interaction. (Stake, 1995, p. 17)

The paradigm shift that society at large is experiencing in the transformation from the Industrial Age to the Information Age is the conceptual frame for this study.

In the Industrial Age, schooling was based on the application of rational, scientific principles to the management of the learning process within classrooms. Teachers' beliefs reflected this model and affected their decisions on what and how to teach. Teachers believed they were the knowledge experts and their job was to pass on this knowledge to students. Life in schools in the Information Age is reflected in the model where students are allowed to construct their own knowledge. This model results in a concomitant change in the role of the teacher to a facilitator. In the Information Age, teachers promote exploration, collaborative work, and critical examination of information. The integration of information technology, primarily the computer, is the driving force in this change. Teacher's beliefs and practices may exist anywhere on the continuum from the Industrial Age to the Information Age.

The purpose of the study was to understand how selected teachers make decisions about using information technology in the instructional process. These decisions were viewed from the teachers' perspective. The research aimed to provide insight into what

influences this decision-making process. Teachers' beliefs were explored as part of the decision making process.

I found that changes in culture, ethics, and epistemological presuppositions, as a result of information technology being injected into society at large, is impacting the school and individuals. This paradigm shift is causing a significant change in the political, social, and economic tenets. This change is stronger than any government, society, school, or individual.

The culture of Hampshire School is affected by information technology's impact on the world at large, and on the English education system in particular. Teachers have a personal belief that information technology skills are critical life skills for all students and equate the importance of the lack of these skills with the inability to read. This belief has emerged from the transformation from an Industrial Age to an Information Age paradigm. Changes within society are having an affect on the teachers which, in turn, affect the decisions they make.

The school was found to be a microcosm of the educational culture of England, where teachers and stakeholders within the community still believe in the primacy of GCSE grades. This is a remnant from an Industrial Age education system. This belief is still the foundation of the educational system and determines the organization and structure of the school. The government, the stakeholders within the community, and the teachers believe in the primacy of the GCSE grades. The teachers continue to see their primary job as improving GCSE scores. The consequence of poor performance on the GCSEs is a national, school, and personal issue.

Teachers' belief in both the primacy of GCSE scores and in the importance of information technology as a life skill color their decisions and create a paradox within which they must operate. The teachers are caught in the transformation from the Industrial Age to an Information Age structure. Their own experiences with information technology outside of school are impacting their belief in GCSE grades as the only goal needed for the success of students beyond secondary school. The new belief in the importance of information technology as a life skill is challenging the supremacy of the GCSE grades. Competing realities make the decision making process difficult.

The analysis of data from this study suggests that there is a complex process that shapes teachers' decisions regarding the use of information technology. The culture of education in England and teachers' beliefs guide the decision making process. Teachers' personal use of information technology, teachers' skills, influence of the administration, student factors, and resources affect the decisions made by teachers. Decisions appear to pass through several different colored lenses on the way to being translated into classroom practice. The color of each teacher's decisions changes as different lenses are applied to meet their needs. The final and perhaps most important lens is how practical will the decision be when it is translated into classroom practice?

In this...sense of practicality among teachers is the distillation of complex and potent combinations of purpose, person[al] politics and workplace constraints. It is through these ingredients and the sense of practicality which they sustain, that teachers' own desires for change are either constructed or constrained.
(Hargreaves, 1994, p. 12)

Summary

Analysis of the data was an ongoing process. This process involved consolidating, reducing, and interpreting what people said, what I observed, and the artifacts that were

collected. "These meanings or understandings or insights constitute the findings of the study" (Merriam, 1998, p. 178).

This chapter contains the analysis of the data collected in the field by me. Categories were constructed in a step-by-step process as the data was collected. A more intensive analysis was conducted once it was determined that there had been an exhaustion of sources, saturation of categories, emergence of regularities, and over-extension of information to indicate that new information being collected was not contributing anything new to the research questions that had been posed (Lincoln & Guba, 1985).

According to this study, the following were found to be influences on teacher's decisions regarding the use of information technology.

1. The change to an Information Age culture is affecting the decisions made by teachers in school.
2. The Industrial Age educational culture and beliefs of England have an affect on the organization and structure of the school, which in turn affects the teacher's decisions regarding the use of information technology.
3. Teachers' personal beliefs are important. However, they play a secondary role in relation to the primacy of national beliefs regarding education in England.
4. Although teachers may be exposed to the same set of influences from outside and within a school, their decisions are colored by their own perspective.

5. The teacher's personal use of information technology, the teacher's skills, the influence of the administration, the availability of resources, and the influence of students all color the decisions made by teachers.
6. From the perspective of the teacher, practicality is an important factor in the decision making process.

This chapter discussed the analysis and findings of the study. Chapter VI contains conclusions and a discussion of the implications for research and practice, and recommendations for further research.

CHAPTER VI

CONCLUSIONS, CONTEXT AND CULTURE, AND RECOMMENDATIONS

The focus of this study was to examine teachers' perceptions and influences on their decisions associated with the integration of information technology into the classroom. Specifically, this study proposed that beliefs held by teachers, the social, historical, and political fabric of education, and the culture of a school and the classroom in particular, were factors in the decision making process. The personal contexts of the teachers were central to the understanding of the issues. Chapter I presented the proposal for the study including its purpose, the research questions, the conceptual framework, and the significance. Chapter II functioned as a review of the pertinent literature concerning the influence of beliefs, technology in the schools, life in schools, and a discussion of the issue of change. In Chapter III, the inquiry design that guided this study was presented. Chapter IV presented the case. The data collected during the field work by observation, interview, and artifact were presented. I conducted all the field work and I was guided by the following research questions:

1. What are selected teachers' perspectives about the use of information technology?
2. What influences selected teachers' decisions about the use of information technology in the classroom?

The purpose of the study was to understand how selected teachers make decisions about using information technology in the instructional process. These decisions were viewed from the teachers' perspective. The research aimed to provide insight into what

influenced this decision-making process. It explored the beliefs and perceptions of a variety of teachers from one secondary school in England.

The fifth chapter discussed the analysis of the data obtained from the teachers and other personnel at the school. Based on the data presented from the site and on the outcomes of analysis, several findings emerged.

1. The change to an Information Age culture is affecting the decisions made by teachers in school.
2. The Industrial Age educational culture and beliefs of England have an affect on the organization and structure of the school, which in turn affects the teacher's decisions regarding the use of information technology.
3. Teachers' personal beliefs are important. However, they play a secondary role in relation to the primacy of national beliefs regarding education in England.
4. Although teachers may be exposed to the same set of influences from outside and within a school, their decisions are colored by their own perspective.
5. The teacher's personal use of information technology, the teacher's skills, the influence of the administration, the availability of resources, and the influence of students all color the decisions made by teachers.
6. From the perceptive of the teacher, practicality is an important factor in the decision making process.

This chapter presents the conclusions, the context and culture, and recommendations for future research.

Conclusions

1. The changes in culture, ethics, and epistemological presuppositions as a result of information technology being injected into society at large, are impacting both schools and individuals.
2. The national educational standards in a country with a national education system have a more profound affect on local schools than in a country with a decentralized education system such as the U.S.
3. Personal beliefs take a secondary position to national standards.
4. Changes resulting from an Information Age paradigm shift may have a more profound effect on teachers' practices than national standards.
5. In education, personal decision making is pragmatic.

National beliefs about education reflect the culture of the nation. In England, the centralized education system dictates the curriculum and the evaluation standards for schools and teachers. Personal beliefs are overshadowed by the primacy of the national beliefs. This is different from the decentralized structure of the U.S. system.

Despite the restraints dictated by national government and the attempt to maintain a national culture in the face of growing globalization, society is moving into the Information Age and dragging teachers along with it. Information technology is changing teachers' lives outside of school, which in turn is having an effect on their instructional decisions. The nature of information technology is changing how and what we do. Information technology has the potential to set the standards for our expectations and designs about how we perceive the world. Information technology has the power to

enable fundamental change in school structure without being dictated by the government but by infiltration through the teachers themselves.

Neil Postman (1992) describes this phenomenon as a technopoly where technology has become so common place that it is invisible and, as a result, we have a tendency to ignore its impact on our culture and our lives. According to Postman, "It is not possible to contain the effects of a new technology to a limited sphere of human activity" (1992, p. 18). We have started to define our society in terms of technology instead of the other way around.

Postman (1992) goes on to point out the impact that information technology is having on schools.

Surrounding every technology are institutions whose organization--not to mention their reason for being--reflects the world-view promoted by the technology. Therefore, when an old technology is assaulted by a new one, institutions are threatened. When institutions are threatened, a culture finds itself in crisis.... Which is why we learn nothing when educators ask, Will students learn mathematics better by computers than by textbooks?...[The question] direct[s] our attention away from the serious social, intellectual, and institutional crises that [information technology] foster[s]. (Postman, 1992, p.18)

Most of the studies that are being done on the effects of information technology are focused on its efficiency as a teaching tool. Instead, we should be looking at how it is altering our perception of learning and how it is undermining our beliefs and goals regarding education.

Schools are caught up in the evolving social, political, and economic upheaval caused by information technology. Selling factors for IT include the claim that it will save the teachers time, increase their efficiency, and that it is important for learning. Teachers and schools are being seduced by the ideal that technology will save them time and make information more convenient. For over worked teachers the promise of making

their job more efficient and easier is very enticing. As a result, teachers' decisions are being influenced by the role of technology in society.

Teachers are being pressured by the government and as a result of OFSTED evaluations to make IT a part of their instruction. The expectation is that teachers will embrace information technology as a defining element of their pedagogical beliefs without asking why or how. More information is seen as being more important than knowledge. There is a tendency for educators to focus on the acquisition of information and high GCSE grades at the expense of developing their thinking skills.

From the government's perspective, a technocentric education system seems to be the ideal future. Technology and the economy are closely linked in the minds of politicians. In order to be economically viable, the country must embrace information technology. Postman cautions us. "The computer is a product of a particular economic and political context and carries with it a program, an agenda, and a philosophy that may or may not be life-enhancing and that therefore requires scrutiny, criticism, and control" (Postman, 1992, p. 185). He sees that one of the major dangers in our present circumstance is that technopoly promotes disintegrative power. He believes that schools should take on the role of giving students a sense of purpose and interconnectedness in what they learn to try to counter the damaging effects of information technology.

The shift from the Industrial Age to the Information Age paradigm is causing fundamental confusion about the goals of education and, likewise, how information technology is actually undermining these goals.

Context and Culture

The decisions that teachers make regarding instruction reflect the goals and conditions that their society values. It is incumbent upon educators and the community to decide the role that information technology should take in order to support the development of the whole child in being part of a caring community--not a cog in an economic/political wheel. The community and the educators need to decide how to structure and deliver education to meet these needs. Kerr (1996) "places human values and educational purposes over and above economic or other socially expedient ends for education, as well as over and above a fascination with technology as an end unto itself" (p. 24).

With this in mind, the school community should be encouraged to formulate a plan for the integration of information technology. Because this integration is in its infancy, now is the time for the community to get involved. Now is the time for schools to establish a framework to make use of the potential and capabilities of IT and at the same time to define the educational purpose and meaning of their institution.. It is time to look at the values the community holds for education in order not to lose site of their ultimate objective, the education of the whole child. If the community is able to put in place a plan for the development of a humanistic educational technology plan, teachers' decisions regarding how and when to use information technology will complement basic education goals. If this plan is not developed, the goals will be imposed by those changes inherent in the economic model of technology which is technocentric, not education centered. Because of the fast pace of change in information technology and society, the

interface between the goals of the school and information technology will need to be revisited on a regular basis.

Mr. Prylor from Hampshire school informed us that he wasn't a Luddite which has come to mean an almost childish and naïve opposition to technology. It is important to note that, "the historical Luddites were neither childish nor naïve. They were people trying desperately to preserve whatever rights, privileges, laws, and customs had given them justice in the older world-view" (Postman, 1992, p. 43). My proposal is that we take a look at the qualities that we want to preserve in our education system and develop plans to preserve them.

Recommendations

Based on the findings and the conclusions of this study, the inquiry design that was followed, and the review of the literature, the following recommendations are made for further research:

1. A study should be conducted to examine how schools are integrating information technology into their existing goal structure.
2. A study should be conducted to examine how goal structures in schools are being affected by the integration of information technology.

Both of these studies could extend the current research by exploring how the political and economic issues of information technology are affecting a change in attitudes and customs within the education system. A change in the goal structure could be heralding a systemic change in education. Adding information about the change process caused by the injection of information technology will be valuable to educational administration and for future planning.

3. A study should be conducted using teachers who are new to the teaching profession and who are part of the Nintendo generation of fluent information technology users. The selected teachers should have had training on how to integrate technology into the instructional program as part of their teacher training. The purpose would be to attempt to understand how their education goals and beliefs regarding information technology differ from teachers who have been in the profession for a period of time.

During the course of this study, I spoke with several student teachers. They spoke of their frustration with the lack of technological resources. From their vantage point, they were being asked to teach in a way that they saw as archaic. They felt the use of technology would make learning easier and more enjoyable. A study using teachers who have less than five years of experience might generate a different perception from teachers who are grounded in an Industrial Era tradition. This information would be helpful in school planning and in the supervision and nurturing of new teachers.

4. Similar studies should be conducted at other secondary schools in England that are at various stages of information technology integration.
5. Similar studies should be conducted using teachers in a specific content area.

Throughout this study, teachers continually pointed out that the potential use of information technology varied depending on the subject area. It was also evident that teachers within a particular department used information technology to various degrees and in different ways. Although the perception of teachers that the potential for IT

depended on the subject area, the reality I observed was quite different. The two recommended studies listed above could add some insight into this issue that was raised as part of this study.

The key to all of these recommendations is to look at the issues from the perspective of the teacher in order to try to understand their reality. Because information technology capabilities and issues are rapidly changing, it would also be recommended that issues are examined more than once over a relatively short period of time. The report of new research in the field of information technology and education is caught in a paradox of its own. If the research goes through the time-honored tradition of peer review and publication, it may be several years before educators in the field have access to the information. This time lag in the face of technological advancements is rapidly becoming a critical factor in the field of research and one that should be considered along with the type of research that is being recommended.

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APPENDIXES

Appendix A: Institutional Review Board Approval

OKLAHOMA STATE UNIVERSITY
INSTITUTIONAL REVIEW BOARD

Date: December 20, 1999 IRB #: ED-00-181

Proposal Title: "COMPUTER TECHNOLOGY IN THE CLASSROOM, TEACHERS' PERCEPTIONS, TEACHERS' BELIEFS AND ACTIONS"

Principal Investigator(s): Nan Restine
Jannett Klinke

Reviewed and Processed as: Exempt

Approval Status Recommended by Reviewer(s): Approved

Signature:

Carol Olson

Carol Olson, Director of University Research Compliance

December 20, 1999

Date

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 with the advisor's signature. The IRB office MUST be notified in writing when a project is complete. Approved projects are subject to monitoring by the IRB. Expedited and exempt projects may be reviewed by the full Institutional Review Board.

Appendix B: IRB Proposal Interview Guide

Sample Questions

Beliefs about Teaching and Learning

1. Talk to me about your thoughts on teaching and learning over the span of your career.
2. Talk to me about your role as a teacher.
3. Talk to me about how you think teachers influence learners.
4. Take a moment and think about your beliefs in what education should be like in an ideal world. Describe this world to me.

Perspectives of the teacher on computer technology

5. Talk to me about your thoughts on computers and their role in education/your classroom.
6. Talk to me about why you feel this way.
7. Tell me about how you use computers now.

Perspectives on change

8. Talk to me about your thoughts on teaching and learning over the span of your career.
9. What has had the most influence on changing how you teach over the span of your career?
10. In your opinion, what has changed most about education over the span of your career and why do you think this happened?

11. How has this change affected you?

Decision making with reference to information technology usage as part of the instructional program.

12. Describe your planning process for a lesson.
13. Describe the ways computers are used as part of your instructional program.
14. What types of software do you find helpful to support your instructional program.
15. Which of the following two types of software programs would you prefer to use in your class?

Program 1 has no stated objectives and allows students to probe and search, navigate freely, and draw their own conclusions and relationships. Program 2 has clearly stated objectives that routes the learner through prescribed instruction and process.

Relationship between beliefs and the use technology in the classroom.

16. Describe your rationale for selecting either program 1 or program 2

Appendix C: Consent Form

I authorize Jannett Klinke to conduct research at the school site for a study entitled Influences on the use of technology in the classroom. The project is scheduled to take approximately 12 weeks. During the course of this study, the researcher will use commonly accepted research procedures including (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. I am free to withdraw my consent and participation in this project at any time without penalty after notifying Jannett Klinke or her 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 thorough 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. For a minimum of two years following the study, the researcher will maintain the data.

I understand the purpose of the study is to examine how beliefs about teaching and learning and other factors influence teachers' perspectives and their decisions about the use of information technology. 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, Dr. Nan Restine, School of Educational Studies, College of Education, Oklahoma State University, Stillwater, OK; (405) 744 8893 should I wish further information about the research. I may also contact Sharon Bacher, IRB Executive Secretary, 203 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 D: Interview Guide Questions

Good morning, my name is Jannett Klinke.

I am doing this interview as part of my research project. The purpose of my study is to examine how beliefs about teaching and learning and other factors influence teachers' perspectives and their decisions about the use of information technology.

Thank you for your willingness to participate in this study. Your participation is very much appreciated. Before we start the interview, I would like to reassure you that as a participant in this study you have several very definite rights.

1. Your participation in this interview is entirely voluntary.
2. You are free to refuse to answer any question at any time.
3. You are free to withdraw from the interview at any time.
4. This interview will be kept strictly confidential and will be available only to my supervisor and myself.

Excerpts of this interview may be made part of my final paper, but under no circumstances will your name or identifying characteristics be included in my thesis.

Do you have any questions or concerns that I can answer about the interview process?

Subjects that you teach?

Number of Years of teaching experience?

Number of Years at this school?

1. Talk to me about your thoughts on teaching and learning over the span of your career.

Has it changed and if so how?

2. In your opinion, what has changed most about education over the span of your career and why do you think this happened?
3. How has this change affected you?
4. What has had the most influence on changing how you teach over the span of your career?
5. Talk to me about your role as a teacher? Has it changed and if so how?
6. Talk to me about how you think teachers influence learners?
7. Take a moment and think about your beliefs in what education should be like in an ideal world. Describe this world to me.
8. Talk to me about your thoughts on information technology and its role in education/in your classroom.
9. Talk to me about why you feel this way?
10. Describe your planning process for a lesson.
11. Tell me about how you use information technology as part of your instructional program.
12. What factors influence your use of information technology?
13. What types of information technology do you use?
14. What types of hardware and software do you find helpful to support your instructional program.
15. Which of the following two types of software programs would you prefer to use in your class?

Program 1 has no stated objectives and allows students to probe and search, navigate freely, and draw their own conclusions and relationships.

Program 2 has clearly stated objectives that route the learner through a prescribed instructional process.

Describe your rationale for selecting either program 1 or program 2.

Appendix E: Follow-up Letter

March 2000

Dear ,

I wish to thank you for participating in the interview session with me. It was very helpful to me for my research that I am doing as part of my dissertation.

Attached to this letter is a transcribed copy of our your recent interview. Please check to make sure that it is an accurate and fair representation of your thoughts and opinions. I want to make sure that the transcript reflects an accurate representation of your perceptions. Please feel free to mark on the copy or to add any further thoughts after you have read the transcript.

Please place the revised transcript in the envelope provided and place it in the post to me. Postage has already been provided. Please contact me if you have any questions or concerns (01223 555 555). If I do not hear from you or receive your revised copy within two weeks, I will assume that the transcript is accurate.

Thank you again for your sharing your valuable time with me.

Sincerely,

Jannett Klinke

Appendix F: Member Check Letter

April 1, 2000

Dear Ms.

I wish to thank you for participating in the interview session with me. It was very helpful for the research that I am doing as part of my dissertation. I know how valuable your time is and I could not have completed this project without your assistance.

Attached to this letter is a draft copy of my analysis based on teacher interviews, observations, and a review of documents. Your name and those of your colleagues have all been changed to female names for reasons of confidentiality. Please review the draft when you get a chance and if you have any comments regarding the analysis please jot them down and send them to me in the stamped envelope that I have provided for you.

I hope this research will give you and other practitioners, administrators, and policy makers further insight into the dynamics involved in the integration of information technology into a school setting.

Thank you again for sharing your valuable time with me.

Sincerely,

Jannett Klinke

VITA

Jannett K. Klinke

Candidate for the Degree of

Doctor of Education

Thesis: COMPUTER TECHNOLOGY IN THE CLASSROOM: SELECTED
TEACHERS' PERCEPTIONS AND INFLUENCES ON DECISION MAKING

Major Field: Educational Administration

Biographical:

Education: Graduated from Great Falls High School, Montana in June of 1967; received a Bachelor of Arts in History and Art from the University of California, San Diego, California in June of 1971; received a Master of Science degree in Educationally Handicapped from Eastern Montana College, Billings, Montana in July of 1978. Completed the requirements for the Doctor of Education with a major in Educational Administration in July, 2000.

Experience: Employed by the Department of Defense Schools (DoDDS) from 1985 to 2000 as an assistant principal at the elementary, middle, and high school levels; employed by DoDDS during the school year 1984-1985 as a teacher of the learning impaired; employed by GST Educational Services in Hillsboro, North Dakota as an assistant director of educational services between 1980-1984; employed as a consulting teacher by GST Educational Services 1978-1980; employed as a VISTA volunteer working on alternative education programs from February 1975-February 1976; employed as a classroom teacher in grades 7-12 in Plains, Montana from August 1972-June 1973.

Professional Memberships: National Association of Secondary School Principals, Phi Delta Kappa, the European Parent, Teachers, and Students Association, Federal Managers Association, the Association of Supervision and Curriculum Development.