Factors contributing to the integration of computer technology in classroom instruction

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FACTORS CONTRIBUTING TO
THE INTEGRATION
OF
COMPUTER TECHNOLOGY
IN CLASSROOM INSTRUCTION

A Dissertation
Presented To
The Faculty of the School of Education
The College of William and Mary in Virginia

In Partial Fulfillment
Of the Requirements for the Degree
Doctor of Education

by
Philip Michael Pavlidis
May 2001
FACTORS CONTRIBUTING TO
THE INTEGRATION
OF
COMPUTER TECHNOLOGY
IN CLASSROOM INSTRUCTION

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FACTORS CONTRIBUTING TO
THE INTEGRATION OF COMPUTER TECHNOLOGY
IN CLASSROOM INSTRUCTION

ABSTRACT

The purpose of this study was to determine what factors contribute to and what factors inhibit the integration of computer technology in classroom instruction in the middle school setting at selected schools in a central Virginia public school system. Information derived from this study may be used to assist in the planning and decision making process by central office and building level administrators.

The population for this study included teachers from three middle schools in a central Virginia public school system. This school system has demonstrated through the Virginia Standards of Learning test scores, an even distribution of results regardless of demographics. A pilot study was conducted in the same school system. Participants completed a questionnaire, and a sample of participants was interviewed. The results were coded and chunked for the purpose of establishing an emerging theme or themes.

There has been a wealth of quantitative data with regard to student to computer ratio and computer to classroom ratio over the last several years. However, there is scant data from a qualitative perspective that may allow for in-depth answers to questions regarding the factors that come into play as to the reasons for the use or non-use of available technology.
Findings indicate that respondents appear to use computer technology for a range of personal reasons, yet are reluctant to use and integrate that technology into classroom instruction. In addition, thematic analysis revealed that time, access, and support appear to be major factors that inhibit the use and integration of computer technology in classroom instruction.

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Chapter 1: The Problem and Setting

Significance of the Study

During the last 20 years, education as a profession has been under attack from a plethora of sources. In the early part of the 1980's, the report "A Nation at Risk" gave an unattractive disclosure of the state of public education, and the students who would become the future of the United States (Urban & Wagoner, 1996). This report, along with other smaller reports, played a critical role in fostering an era of change in public education. For the first time, people not directly connected with public education were asking tough questions. Many of those questions could not be answered adequately, and the pressure for reform became intense.

The answer to the public outcry and perception of public education appeared to lie in the reformation or restructuring of how schools educate young people. Restructuring has taken on many forms. Schools adopted mission statements, altered curricula, devised alternative forms of line and staff management, established teacher councils and teams, designed varied student schedules, and implemented diverse instructional delivery methods (Urban & Wagoner, 1996).

Technology literacy has became a significant component of public school reform. National policies and plans such as "Getting America's Students Ready for the 21st Century: Meeting the Technology Literacy Challenge" (U.S. Department of Education, 1994) set extraordinary goals for educators across the country. For example, the Commonwealth of Virginia has implemented new curriculum standards that explicitly state that all students and teachers demonstrate computer literacy. Non-compliance may result in the loss of accreditation for schools (Virginia Department of Education, 1997).
On the heels of this massive organizational dynamic, public education as a profession entered the computer age. Only a few years after schools began restructuring, school divisions were forced to implement computer technology into the curriculum (Maddox, 1997).

According to Means (1994), what education reform is asking teachers to do appears to be a much more difficult task than conventional teaching. Regardless of whether or not teachers use technology as part of the reform process, they need time to experiment and achieve a level of comfort conducive to fostering new instructional techniques. Support in this process is needed along with an understanding that they can experiment without placing their careers at risk. Further, the effective use of technology cannot be accomplished until teachers have thoroughly assimilated it into a larger instructional plan. The implication is that implementations of technology must begin with what teachers want to foster, and that teachers need to play an integral role in the technology selection and application to meet their goals.

According to the (Office of Technology Assessment [OTA], 1995) there are over six million computers in schools across America at a cost of about $500 million dollars. However, the OTA report stated that computers are used for simple drill and practice exercises with the total capabilities of the machines lost to ignorance. In addition, according to the (National Center for Educational Statistics [NCES], 1999) approximately only 50% of public school teachers who have computer access use them as part of their instruction. Of those teachers who use computers in their instruction, it was determined that 61% did so to some extent, and 51% used drill and practice, along with some problem solving and analysis.
According to Ertmer (1999), regardless of the fact that computers have become available and affordable, little change has occurred in how schools conduct their business. Early models of educational change implied that computer access and their integration in classroom instruction were directly proportional. However, computer technology is not easily or readily assimilated into existing teacher routines. Ertmer attributes the difficulty of assimilating computer technology in classroom instruction to what she terms as first and second-order barriers. First order barriers are extrinsic to teachers and include resources such as equipment, support, training, and time. Second-order barriers appear to be rooted in teachers' beliefs about the instructional process, and may not be obvious or apparent, even to them. Further, second-order barriers are common among teachers. In addition, these barriers are thought to cause more difficulties than first-order barriers in that they are personal and deeply ingrained. Ertmer stated that traditional perceptions of the instructional process are major limiting factors to the integration of technology.

The NCES report supports this in that among the group of teachers who have computers at home, those teachers with the fewest years of experience in the classroom were more likely to use the technology in their instruction than those with the most years of experience. In addition, 84% of teachers have a minimum of one computer in their classroom with 36% having one, 38% two to five, and 10% more than five computers. It was determined that the number of computers in the classroom is directly proportional to their use in instruction (NCES, 1999).

Reasons cited by teachers as barriers to computer integration in instruction include not enough computers, lack of release time to learn how to use computers, and
lack of time in student schedules. Teachers in secondary schools, large schools, and city
schools were more likely to report the lack of computers as a barrier as opposed to
elementary teachers in small schools or rural settings. It was determined that generally,
teachers' who perceived lacking computers and the time for their use as barriers, were
less likely to integrate the technology in their instruction (NCES, 1999).

The foremost question is how to better use these machines in classroom
instruction. When teachers are trained to use computers, they are typically taught the
basics of the mechanical components and their functions (OTA, 1995). In addition, there
is no diversification of training. According to the OTA, teachers are taught how to use
computers in the same way regardless of content or grade level that they teach. For
example, in science education, teachers should be able to not only use the computers and
ancillary software, but also be able to critique and select software that would allow
student experimentation, data analysis, computation, and integration to allow for personal
value. Moreover, according to the State Council for Higher Education in Virginia (1997).
training programs should be designed in a way that allows teachers to learn how to
integrate computer use in their particular content area and grade level.

According to Fullan (1991), making changes in educational practice is
multidimensional and can vary among groups. It includes occupational and personal
identity, which begs the question, what then are the occupational and personal identities
needed for connecting the continual process of restructuring and the integration of
computer technology in classroom instruction? How do these two different entities affect
each other and impact their effective implementation?
Without a doubt, these schools have invested millions of dollars to purchase technology for classroom use. The time is ripe to seek new knowledge that will ensure meaningful implementation of computer technology in instructional practice in schools. This study explored the factors that relate to and facilitate computer technology integration in classroom instruction.

**Statement of the Problem**

Given the aforementioned, a logical question emerges: What are the factors that contribute to computer technology integration in classroom instruction, and what are the factors that inhibit computer technology integration in classroom instruction?

**The Principle Research Question**

What are the factors that facilitate and what are the factors that inhibit the integration of computer technology in classroom instruction in schools?

**Subsidiary Questions**

1. What is the present level of computer technology integration in classroom instruction at three public middle schools in Virginia?
2. What are the institutional, conceptual, and personal factors that inhibit or enhance the implementation of computer integration?

According to the (OTA, 1995) there are over six million computers in schools across America at a cost of about $500 million dollars. However, the OTA stated that most computers are used for simple drill and practice exercises with the total capabilities of the machines lost to ignorance. Because of the disparity between the cost of the machines, ancillary materials, maintenance, continual upgrading, and the final products that result from their use, questions need to be answered. The foremost question is how to
better use these machines in classroom instruction. To this point in time the research shows that we do not know the answer.

Just as the industrial revolution challenged and changed the way society conducted business and educated its young people, so too has the technology revolution of today. Young people of today will be expected to know and use computer technology for almost everything they do in life. Email, Internet, e-commerce, e-trading, online courses, and multi-dimensional communications are only a few of the new entities the technology revolution has brought forth.

It stands to reason that the schools of the future may no longer use paper, hardcover books, and the like. Instead, students will learn through using tools yet to be imagined. Who will teach these children? What should their level of expertise in technology be? What methods will administrators employ to foster self-initiated implementation and integration of the new technology by their faculties? Therefore, it is logical to ask and seek answers to the questions: What are the factors that facilitate the integration of computer technology in classroom instruction and, What are the factors that inhibit the integration of computer technology in classroom instruction?

Theoretically, schools as organizations adapt to change in various ways. According to Cuban (1992), there are three common beliefs that contribute to the assumptions associated with change. First, that planned change is positive, allows for growth, and is a means toward progress. Second, that change in schools is counter to stability or a static state. Third, that once planned change is initiated and accepted, improvement is imminent. In addition, Cuban stated that there exists a continuum that runs from changes externally imposed to changes made voluntarily. External forces such
as federal and state laws, new regulations, and new policy mandates appear to give school officials little choice in the process of change. Further, and because of that, schools and school officials question proposed change and proceed with implementation in various ways. School officials either endorse and act upon a proposal quickly, or they question the direction the change will take their organization and stall implementation.

One method used by school officials to resist the adoption of change is to initiate compensatory programs for the sake of appearance while maintaining the status quo. For example, schools may purchase computers for student use, but place them at locations that restrict use time (Cuban, 1992). At the other end of the continuum, voluntary change encompasses designs and blueprints that school officials and policymakers elect to make, adopt, and implement.

Ironically, the key component to the successful implementation of change, whether voluntary or involuntary is missing. Teachers appear to be seldom mentioned in the process of change. Yet, these are the people with whom adoption, acceptance, and the implementation of change rests. It is logical then to assume that external change working in concert with voluntary change inclusive of faculties, to achieve a mutual goal, would ultimately lead to successful implementation. It is upon these assumptions that this study is based.

Educators are often asked to embrace a new innovation only to later abandon it when it either failed to meet expectations, or fell victim to political and/or economic pressure (Vanderpan, 1995). As a result, teachers have often viewed change as part of the process of administrative rotation. According to Vanderpan, with the arrival of each new principal or superintendent, so too arrived program changes. Many teachers believe that if
they resist the proposed innovation long enough, it will eventually be abandoned with the subsequent administrative changes.

For example, Ely (1997) stated that in order for the use and integration of technology to play an important role in schools, its purpose must be clear and understandable. We must only look to past attempts in the integration of technology in the forms of television, filmstrips and videodisc players to see that having these devices in the classroom is not enough to promote successful integration. Each form of past technology had educators convinced that they would improve education overall. however. Ely. stated that the key flaw in that thinking was that several crucial questions were either never asked or not given their proper place in the assessment of technology integration. One question is: How will the technology be used in the classroom? Moreover. Rogers stated that in order for any advances in technology to be integrated successfully, only a brief timeframe exists for that to occur, otherwise, it simply becomes another part of the established methods of practice. Even the most advanced technologies can become an ingrained feature of the old methodologies making the use of these new technologies in different forms almost impossible. This study intends to explore the factors that facilitate and inhibit the integration of computer technology in classroom instruction.

Definitions:

Formal and informal norms.

Formal and informal norms are legal and school division responsibilities associated with roles that allow for opportunities to influence change, and establish a history of reward and punishment associated with change. (Margolis, 1991).
Organizational/Institutional barriers.

Coombs defines organizational/institutional barriers as narrow formal rules, rigid job descriptions, and irrelevant evaluation procedures. (Coombs, 1988).

Conceptual barriers.

Conceptual barriers include poor problem definitions that result in ambiguity of response. (Coombs, 1988).

Computer Technology.

Merrill defines computer integration as the combination of technology and traditional teaching procedures to produce student learning. (Merrill, 1997).

Delimitations of the Study

This study was delimited in the following ways:

1. The three schools selected have computers in place in a majority of its academic classrooms.

2. The faculties of each school had formal training in the use of computer technology by way of staff development or college courses.

3. The schools had as part of their organizational structure, at least one aspect of a change in practice that aligns with the concept of restructuring. This would include but not be limited to alternate block scheduling, team teaching, sitebased management, collaborative teaching, and councils.

4. The researcher observed and interviewed the faculties of the three schools selected. Thus, not all people involved with technology implementation had a voice.
Limitations of the Study

1. Sample size and representation of the sample may effect generalization of the study.

2. The reliability of instrumentation to measure the variables in the study.

3. The ability of the researcher to conduct interviews that are fruitful and productive.
Chapter 2: Literature Review

This review of literature examines three broad categories that describe the intricacies of the dynamics involved with leadership, restructuring, and the implementation of initiatives. First, the process of change in the profession of education will be explored from an historical perspective. Second, leadership, restructuring, and its impact on educational practice in the contemporary will be examined. Finally, the implementation and integration of computer technology and its impact on public education to date will be investigated. This review of the literature will establish the need for this study.

The Change Process In Education: An Historical Perspective

In a comprehensive, synoptic discussion of the history of curriculum, Orenstein and Hunkins (1998) stated that historical foundations of curriculum in the United States can be traced to the educational experiences of colonial Massachusetts during 1642-1776. The setting was comprised mainly of Puritans who adhered to strict principles of theology. The major function of public schools was to teach children to read the scriptures and writings of civil affairs. This goal made reading, writing, and spelling key elements of the curriculum. The Massachusetts legislature required that parents ensure their children could read and understand principles of religion as well as the laws of the Commonwealth. Under the Old Deluder Satan Act of 1647, a mandate was issued that required any town of 50 or more people to appoint a reading and writing teacher. Historians have stated that these were the precursors to modern day public education laws, and the public schools movement.
As time progressed, the question of expenditures of public funds for educational purposes created competition between religious and political groups. No single system of schools could be established because of differences between groups. What evolved instead were parochial and independent schools related to different ethnic groups, each with significant community and local control.

Further changes in public education emerged as a result of societal needs. Thomas Jefferson noted that "If a nation expects to be ignorant and free in a state of civilization, it expects what never was and never will be." (Ornstein and Hunkins1998). This was followed by what most professional educators consider the most dynamic time in education. Visionaries in the field, such as Tyler, were instrumental in designing the beginning of developmentally appropriate learning environments. The age of grade level schooling was born. With this came the question, what to teach and to whom? Curriculum was developed based on the need to educate children in a meaningful form to achieve a desired end. The scientific movement, psychology, religion, economics, and character were now aligned to take the form of an integrated system to meet the needs of a changing society.

As schooling became a cornerstone of society, Tyler developed a set of questions and assumptions about education in general, and specifically curriculum. According to Tyler (1930), the following questions should be asked: 1) What educational purposes should the school seek to attain? 2) What educational experiences can be provided that are likely to attain these purposes? 3) How can these educational experiences be effectively organized? and 4) How can we determine if these purposes are being attained? It is ironic after years of tinkering, public school curriculum appears to be
almost where it began. Even though there are scholarly writings that guide educational practice and evolution, we as a society appear to slide backward due to the historical fact of cultural influence. In modern society, traditional principles and ideals, rather than logic appear to guide decisions about curriculum and change (Beane, 1991).

**Present Day Changes in Education**

During the last 20 years, middle schools across the country have been developing growing pains. According to Fullan (1993), the problem stemmed from the fact that school reform was guided by people who were traditional educators of the past. Restructuring is change, and change is a complex process. Consider that in sitebased schools, shared decision making, alternative scheduling, team teaching, collaborative teaching, curriculum integration, and the use of computer technology across the curriculum could all be included as current dimensions of restructuring. This presents a difficult situation at best. Fullan stated, when the separate issues of restructuring are addressed, one needs to only add the unplanned changes to the mix to see clearly that the process is no longer simple. In fact, the process of change takes on a new and almost synergistic dynamic. Fullan also stated that it would be virtually impossible to make sense of all possible interactions. To better understand the conflicts and obstacles of change in middle schools, and for that matter schools at all levels, the concept must be broken down and examined. I begin that examination with the impact of the change process on computer integration.
Impact Of The Change Process On Computer Integration

The fact that many schools across the United States of America are in the process of restructuring and implementing computer technology in classroom instruction leads to the issue and implications of change. Fullan (1991) found that change involves initiation, implementation, and continuation. In addition, he concluded that change is a process and not an end in itself. He is quick to point out that evidence does exist that certain key variables positively influence meaningful change. How those variables work, remains unclear to this day. Even with complex studies that were quantified and generalizable, individual circumstances and organizational dynamics make the change process highly complex and beyond generalization. The conceptual model described by Fullan includes characteristics of change, local characteristics, and external factors.

Characteristics of change include organizational and individual needs, clarity of intended outcomes, complexity of the amount of skill and knowledge required by those implementing and undergoing the process, and quality, which refers to the ability of organizations to support the initiatives with adequate resources (Fullan, 1991). Most attempts at change lead to failure. This can have a demoralizing effect on organizations in that over time they build a track record of attempts to change and failure to fully implement the initiative. This establishes a type of precondition relative to the next initiative (Fullan 1991; Margolis, 1991). A critical factor in the process of change involves the level and direction of initiatives. According to Fullan, teacher made decisions are often negatively associated with change, whereas higher level administrative decisions for change are positively associated with full implementation. There is little doubt that when superintendents set and support initiatives, and
demonstrate an understanding of the realities involved, implementation and continuation are positively impacted.

In addition, the role of the principal in initiating, implementing, and continuing a process is critical. Fullan (1991), noted that all major research demonstrates that principals remain a strong influence in the process of sustained change. Also, even though teachers do not necessarily impact sustained change implementation positively when self initiated, their role is essential in the implementation and continuation of administrative decisions. As Fullan stated, it is individual action in the classroom that counts. According to Mager (1992), there are several factors needed for teachers to implement instructional technology. Those factors are: opportunity, skill, support, and self-efficacy. Opportunity speaks to the need to have in place the facilities to accommodate computers, and the necessary software and hardware essential for full implementation. In addition, according to Becker (1994), exceptional teaching practice using computer technology was noted when student to teacher ratio was small. This lead the researchers, to conclude that there was greater opportunity for meaningful use and integration under those conditions.

Skill refers to the ability to perform a given task utilizing prior learning, training, and natural abilities. Without a combination of the aforementioned, implementation of computer integration in classroom instruction would be suspect (Mager, 1992).

Support describes the climate of the environs that would counter atrophy with regard to both use and integration of technology in instruction (Mager, 1992). There are several subcategories involved with the aspect of support, they are; peer, technical, curricular, access, and time supports. To have the requisite skills in the use of computer
technology is not enough to allow for meaningful curricular integration. Teachers must have a peer group that they can talk with in order to integrate computers into their instruction. (Becker, 1994; Hadley & Sheingold, 1993).

Technical support involves the level of knowledge teachers are expected to have with regard to the physical make-up of the machines themselves. As one would not expect users of the telephone to be able to make reparations when needed, so to teachers need technical support in a prompt fashion when there is need (Means & Olson, 1994).

In addition, teachers must have a degree of support for the integration of computers into the curriculum. A specialist with expertise in curriculum and instruction as well as the use of computers in instruction is critical as a support (Means & Olson, 1994). Also, the aspect of time is crucial when considering support mechanisms. There is little question that in order for teachers to design and deliver integrated lessons using computer technology, they must be given the unencumbered time to assimilate software, collaborate in planning, and use the computer on a personal level (Becker, 1994; Dwyer, 1994; [OTA]. 1995).

Moreover, the literature reveals self-efficacy as a factor that plays a crucial role in the use and integration of computer technology in instruction. For example, according to Bandura and Adams (1977), the continuum of social change almost forces personal change subsequently mandating the need for self-appraisal of personal abilities. In addition, positive feedback in professional peer relations as well as positive supervisory input is only as beneficial as the credibility of the peers and/or supervisors. Also, according to Mager (1992), there is a positive correlation between self-efficacy, effort, actual performance level, and task completion. Support for the aforementioned rests in
the results of several studies that looked at the use of computers and teacher attitudes.

Loyd and Gressard (1984) designed a computer attitude scale, and Abel-Gaid.

Trueblood and Shrigley (1986), designed a stepwise attitude scale and instrumentation to measure teacher attitudes in the use of computer technology in instruction. Also, Jorde-Bloom (1986), and Qutami and Abu-Jaber (1997), agreed that self-efficacy while not the only factor, is robust in determining the integration of computer technology.

Leadership: Its Impact On Educational Practice in General and Computer Integration in Particular

The historical pattern of change in education often seems to be one of halting redirection (Conley, 1991). Educators were often asked to embrace a new innovation only to later abandon it when it either failed to meet expectations, or fell victim to political and/or economic pressure (Vanderpan, 1995). As a result, teachers have often viewed change as part of the process of administrative rotation. According to Vanderpan, with the arrival of each new principal or superintendent, so too arrived program changes. Many teachers believe that if they resist the proposed innovation long enough, it will eventually be abandoned with the new administrative changes. Others believe that schools attempt to change by simply presenting the same things under different names.

For example, Ely (1997) stated that in order for the use and integration of technology to play an important role in schools, its purpose must be clear and understandable. We must only look to past attempts in the integration of technology in the forms of television, filmstrips and videodisc players to see that having these devices in the classroom is not enough to promote successful integration. Each form of past technology had educators convinced that they would improve education overall, however.
Ely stated that the key flaw in that thinking was that several crucial questions were either never asked or not given their proper place in the assessment of technology integration. Such questions as: How will the technology be used in the classroom? What is the intended purpose of the integration of this technology? Who would use this technology and what should be their level of expertise? What is the frequency in which this technology should be used?

Moreover, Rogers (1995) stated that in order for any advances in technology to be integrated successfully, a brief timeframe exists for that to occur, otherwise, it simply becomes another part of the established methods of practice. Even the most advanced technologies can become an ingrained form of the old methodologies making their use in different forms almost impossible.

In 1916, Dewey discussed the concept of interactive, democratic modeling, and decision-making. Some 70 years later, a concept called site-based management, using interactive, democratic modeling and decision-making was introduced (Vanderpan; 1995 Beane; 1991). Although some schools have maintained this concept, some have not. Like the idea of total quality management, site-based schools have seen some success (Beane 1991). However, their numbers appear to be on the decline due in part to insufficient and piecemeal implementation. Vanderpan (1995) stated that in many locations where site-based management has been implemented, preservice training in the process has been conspicuously absent. In many cases, schools have seen no noticeable change due to the fact that the process has been only partially implemented.

There is support for the assumption that the principal is the key player in setting the overall tone or climate of the school (Margolis, 1991). It is recognized that this tone
or climate impacts the faculty directly with regard to the openness of the administration
too new ideas and practices. According to Connelly and Clandenin (1988), leadership can
emerge as a positive expression of a principal's personal philosophy. Ideally, the
principal's philosophy can function as a context for addressing problems and issues.
potentially making policies unnecessary. This philosophy, in effect, becomes a
curriculum for the administration of change, as it pervades the school. McAfee (1992)
stated that principals must be aware that their influence over what students learn is
determined by the way their school is governed. In addition, Vanderpan (1995), stated
that many principals believe that they are the only ones held accountable for the ultimate
success or failure of their schools. and, because of that, they should dictate policy. Those
schools that reported success with the change initiative of site-based management stated
that the administration was open and provided the needed staff development and support
for all.

For example, according to Means, Olson, and Singh (1995), administrators should
lead by learning and using new technology as an example for their faculties. In addition.
Ely (1997) stated that schools must have a shared vision and commitment to the process
of restructuring, with technology as the critical aspect to achieve the desired success.
Moreover, Ely, and Singh & Means, (1997) stated that administrative example and
support are not enough to achieve the desired outcome. Without the presence of skilled
technical support for teachers in both the use of technology and its curricular integration
on an ongoing basis, little if any change in methodological practice will result. One of
the problems associated with support for teachers in the use of technology is that often,
support personnel will be skilled in the technical use of the machinery, but ignorant to its
integration across curricular lines. Willis (1992) found that support for technology is of little value without a clear understanding by support personnel of its integration across all content areas. Furthermore, Ely stated that effective use of support personnel can only occur when they are used as change agents within the educational setting and not charged with additional responsibilities as a classroom instructor. In addition, school restructuring and instructional change through the integration of technology can encompass as much as three to six years to become an integral part of instructional delivery (Dwyer, 1994; Hadley & Sheingold, 1993; Means, 1994; Means et al., 1995).

There is a veritable plethora of literature that states how technology can promote and cultivate the restructuring process, however, recent research has found that technology has done little to foster change in instructional delivery (Means, 1994; Ertmer, 1999). Instead, technology has become little more than an expensive tool that is seldom used during instruction that remains unchanged.

For administrators, understanding change and the resistance to change must be of primary importance (McAfee, 1992; Vanderpan, 1995). This understanding in and of itself may allow administrators opportunities to plan for and have ready remedies to problems associated with change. According to Margolis (1991), resistance is not only a function of psychology or pathology. Analysis of structural or organizational variables contributing to resistance is critical. Margolis found several sources, formal and informal norms of how people should behave in school, legal and division responsibilities associated with particular roles, opportunities for teachers to influence the nature of proposed changes during the formative stages, and resources to support proposed changes. In addition, the schools history of reward and punishment with regard to
personnel, the reputation of those proposing and implementing the change, the degree to which power and expertise is decentralized, and the clarity of the schools goals and the degree to which teachers embrace the goals are critical. Moreover, the strength and importance of the procedures and habits targeted for change, and staff development to undertake new challenges and opportunities for research and discussion were vital.

According to Ertmer (1999), regardless of the fact that computers have become available and affordable, little change has occurred in how schools conduct their business. Early models of educational change implied that computer access and their integration in classroom instruction were directly connected. However, computer technology is not easily assimilated into existing teacher routines. Ertmer attributes the difficulty of assimilating computer technology in classroom instruction to what she terms as first and second-order barriers. First order barriers are extrinsic to teachers and include resources such as equipment, support, training, and time. Second-order barriers are teachers' beliefs about the instructional process, and may not be obvious or apparent, even to them. Also, second-order barriers are common among teachers. These barriers are thought to cause more difficulties than first-order barriers in that they are personal and deeply ingrained. Ertmer stated that traditional perceptions of the instructional process are major limiting factors to the integration of technology.

According to Combs (1988), resistance to change is less likely when teachers view the proposed changes as making their lives more meaningful and productive. Combs suggested the following for those who desire meaningful change to result coupled with faculty input and support. First, do not impose solutions upon people, as most people like to make up their own minds. There are many ways to achieve goals, how one...
gets there is unimportant, as long as what is done works, and is void of negative side effects. Second, concentrate on beliefs and perceptions. People tend to behave in accordance with how they see and feel about things. Therefore, if teachers see changes as adverse to their interests, resistance is virtually assured. Administrators must visualize things from the teachers' perspective in order to anticipate teacher behavior. Third, emphasize process and open systems thinking. There are times when the process may be more important than the product. Involving people in the give and take of consensually formulating goals and deciding on courses of action is more likely to increase their commitment to an outcome than is the autocratic imposition of ideas. Fourth, focus on what people think is immediately important and troublesome. Administrators and teachers often differ on what they think is important. When people are required to do what appears to them to be trivial, they do it grudgingly, half-heartedly, and so increase the likelihood of negative results. Therefore it is critical to emphasize problems that teachers view and recognize as important. Fifth, encourage innovation and change with the potential to achieve mutually desired goals. The goals should be more important than the procedures used to achieve them. While goals can have the effect of energizing people and their efforts, so too they may dampen enthusiasm and commitment. Teachers and administrators must agree on clearly defined goals they both view as critically important.

Sixth, eliminate barriers to reform. Barriers to change are traditionally either conceptual or organizational. Coombs (1988) stated that conceptual barriers include poor problem definitions that result in ambiguity of response. For example, consider the administrator who requires the use and integration of computer technology by his
subordinates, while he/she does not model that same behavior. Organizational barriers include narrow formal rules, rigid job descriptions, and irrelevant evaluation procedures. Consider the likelihood of cooperative learning receiving meaningful consideration by a faculty that is evaluated in part by how orderly their classroom is with regard to students being in their seats. Seventh, allow opportunity for task identity. Task identity speaks to the degree in which teachers complete a task with a visible outcome. Teachers are often asked for input that reflects nothing more than bits and pieces of a larger picture that may never emerge. This ultimately leads to questioning by teachers that reflects the “why are we doing this” attitude. Eighth, administrators must attach significance to the task at hand. This reflects the degree to which the task affects students and the importance teachers assign to the outcomes. Ninth, allow for an environment that fosters autonomy among the teachers. Involving teachers in decision making and encouraging them to modify programs to fit their individual needs and ways of functioning allows for autonomy that promotes feelings of responsibility for outcomes. Tenth, get feedback from teachers about teachers and the art of teaching within the newly formed programs. Teachers need clear and observable short and long term goals which they value and believe achievable (Combs, 1988). Parish and Arends (1983), concluded that successful initiative implementation was characterized by teachers adapting programs to meet their needs and ways of doing things, along with change agents respecting the desire of teachers to determine what would happen in their classrooms with their students.

Moreover, the desired end result should not be a specific finality; instead it should be a cultural mindset among the faculty and administration that the process of change is overlapping and dynamically complex (Fulian, 1993). The idea that more innovation in
education is needed is supported (Margolis. 1991; Fullan. 1993; Vanderpan. 1995; Hope. 1998). However, all appear in agreement that instead of utilizing a cyclic process for change that addressed new problems as they arose, there was a reaction to implement one program after another without regard to the interactional dynamics and overall effects. The result, according to Fullan, was that easy fixes seem to have been easily withdrawn. Also, quick fixes violate the premise that change is a function of conditions that allow people to implement personal and shared visions over time. Fullan stated that these cannot and should not be mandated. Moreover, according to Fullan (1993, p.19) “if change involved implementing single, well-developed proven innovations one at a time, perhaps it could be blueprinted.” But school districts and schools are in the business of implementing a bewildering array of multiple innovations and policies simultaneously. Restructuring reforms are so complex that solutions for particular settings cannot be known in advance.

**Critical Summary**

Administrators must be aware of the people they deal with on a daily basis. They must know both professional and personal attributes. Administrators must know the habits, concerns, and values of those whom change depends. Even minor changes can be difficult and resistance among faculty almost assured. An understanding of and effective response to structural and personal factors appears to be critical in overcoming resistance to change. Theoretically, change associated with directives from administrators is met with resistance and skepticism, while change initiated by teachers tends to have positive results as long as administrators endorse and support the initiative. Therefore, in order for meaningful sustained change to take place, administrators must be willing to provide
models for teachers to select from with regard to whatever it is they seek to adjust. In addition, the full weight of administrative support must follow the decision by the teachers to support implementation and continuation of the selected change in practice.

Factors that Promote and Inhibit Computer Technology Integration

According to Ertmer (1999), regardless of the fact that computers have become available, little change has occurred in how schools conduct their business. Ertmer, as mentioned above, attributes the difficulty of integrating computer technology in classroom instruction to what she calls first and second-order barriers. First order barriers are external to teachers and include resources such as equipment, support, training, and time. Second-order barriers appear to be rooted in teachers’ beliefs about the instructional process, and may not be obvious. Further, second-order barriers are common among teachers. In addition, these barriers are thought to cause more difficulties than first-order barriers in that they are personal and deeply rooted. These traditional perceptions of the instructional process are major limiting factors to the integration of technology.

There is little question that some teachers integrate computer technology in their classrooms effectively but others do not. According to Evans-Andris (1995) the use of technology in classroom instruction seldom goes beyond simple tutorials and drill and practice. Becker (1994) stated that drill and practice use of technology is the norm rather than the exception. The use of technology in this way does little more than to promote rote memorization and nothing to develop higher order thinking (Urban & Wagoner, 1996).
There is a large body of research that has established that this use of technology is counter to its intent. Rather, technology should be integrated across the curriculum in a manner that will develop higher order thinking skills (Hadley & Sheingold, 1993; Hill, Manzo, Liberman, York, Nichols & Morgan, 1988; Hurst, 1994; Maddox, 1997; Merrill, Hammond, Vincent, Reynolds, Christensen & Tomlin, 1997). Becker (1994) stated that higher order skills are stressed an average of only 4% of the total time computer technology is used for instructional purposes. According to Maddox (1997), effective procedures for the implementation and use of computer technology in classroom instruction must consider the teacher first and foremost as a knowledge broker. There must be a clear understanding of the amount of information for which they are responsible. In addition, support services must accompany computer technology. Also there are services that teachers need and or must create to achieve desires outcomes. Given their professional duties and increasing demands placed on them by way of restructuring, teachers need assistance to view technology as an effective tool. Maddox noted that teachers are one of the few groups of professionals without a technology enhanced support infrastructure. Physicians, engineers, and lawyers, rely heavily on support in the use of technology that allows them to access and assimilate massive databases. It is unlikely then that teachers, without support, will develop sufficient interest in technology that would lead to trial, evaluation, and use in the classroom (Rakestraw, 1997).

Hadley and Sheingold (1993) support this with their findings and classification system developed and based on teachers' integration of technology and experience. Five categories were developed that place teachers based on their particular level of
computer training and use of technology. The categories are struggling aspirers, enthusiastic beginners, supported integrators, high school naturals, and unsupported achievers. For example, struggling aspirers are teachers who have little experience with technology. This group was found to use computer technology on a limited basis, and rarely if ever for personal reasons. The category labeled high school naturals were found to use technology in a variety of ways personally and professionally. For example, this group often used computer technology as a way to integrate information retrieval, critical thinking, and research into their instruction. Evans-Andris (1995) supports this finding in reporting that almost 60% of teachers studied showed what they call avoidance style, where students were allowed to use computers for drill and practice but the teachers never used the technology themselves. Also, only 28% of teachers studied integrated computer technology into their lessons, and 8% were observed to teach about the use of computers as opposed to teaching with the use of computers.

Teachers benefit from on-site or remotely accessed computer support structures that can enhance professional activity, preserve time, increase skills and knowledge, focus attention and foster accountability. Involving teachers at the conceptualization stage of information technology planning, deployment, and integration, and use has been an effective way to support their personal curiosity for knowledge (Rakestraw, 1997). Many new teachers bring a greater awareness of technology that may allow them to do more than experienced teachers. Technology presented through an intermediary can have the effect of bringing these teachers together for a common goal. Maddox (1997), stated that the effective adoption of information technology
should work to combine bottom-up event based teacher knowledge, with top-down collaborative goal-driven technology objectives. This combined approach signals to teachers that they are recognized as producers of knowledge, as well as users of technology.

Hope (1997) noted that increased use of computer technology in classrooms should not be for the sake of change itself. In the past many schools have failed to reach goals because their purpose was ambiguous and poorly explained to stakeholders. Easdown (1996) stated that teachers often do not know what they are expected to accomplish with technology, that technology may not speak directly to specific needs, or even offer an advantage over the status quo. There is substantial support in the literature that, in order for teachers to be effective with and even use technology in the classroom, they first must be able to use them appropriately (Baker, 1990; Cameron, 1994; Wyatt, 1985). According to Hope, administration and faculty share the belief that technology is the solution to problems, and that perceived barriers by the faculty would be addressed. Barker (1990) and Chopra (1994) stated that preparing teachers to perform specific tasks is first and foremost. Moreover, teachers need time to practice and experience the technological capabilities in an effort to plan for potential use within the curriculum ([OTA], 1995; Weal, 1992). This is critical for teachers with 15 or more years of experience who did not have computer technology as part of their pre-service education (Kinnaman, 1990). In addition, there is evidence that principals should not mandate teachers’ use of computers in the classroom. Instead, technology should be configured to provide advantages over what teachers currently do to achieve desired goals (Hope, 1997).
Also, willingness and ability of administrations to arrange for release time, provide resources, encouragement, and technical assistance if computer technology is to be used as part of classroom instruction is essential ([OTA], 1995; Weal, 1992).

In a multiple case study of nine schools and one network of 462 schools, several findings revealed the complexity of combining the use of technology in classroom instruction. Wiske (1990) concluded that initial enthusiasm for technology, especially computers held predictions of making teachers jobs easier; that prediction was found to be untrue. Teachers were unanimous in stating that in the early stages of implementing technology, their jobs became more difficult. Technical demands appear to be only the beginning with regard to effective implementation. Teachers must be able to combine a variety of tasks such as design, adaptation, and selection of technologically enhanced materials. Further, technology enhanced curricula place demands on subject matter knowledge, and role. For example, teachers must be able to design or adapt existing curricula, act as coaches or facilitators, and assess student performance in more complex ways than in the past. In addition, teachers need to learn how to use a variety of technological applications, and develop criteria and skills that would allow for integration into broader instructional activities (Newman, 1992). In addition, according to Riel (1990), the use of computers in classroom instruction requires teachers to establish strategies for time allocation, student access of the technology, and techniques for managing technology-based instruction. To be effective, these decisions must be connected to curricular issues and intended student outcomes. Increasingly, networks are providing schools with information about the implementation of technology within curricula. Although useful, access to resources
does not meet all teachers’ needs for technical support, nor does it provide an efficient way to assess the potential of each technology application with regard to teaching and learning (Riel, 1990). According to Lehrer (1992), when teachers integrate technology into the curriculum, they unknowingly become curriculum developers. The integration of technology is often referred to as computer integration, however this form of use has no agreed upon definition. Merrill (1997) defined computer integration as "the combination of technology and traditional teaching procedures to produce student learning" (p.273). According to Singh and Means (1997) unless students are engaged in realistic activities that promote real world value, little if any true learning would result. In addition, the use of technology to address realistic situations would promote the integration of disciplines, foster a team approach to problem solving, and enhance individual responsibility. This position is supported by Pea and Gomez (1992), who stated that computers should take the role of resources that allow for the necessary human interactions and communications essential for learning. Moreover, Hill (1988) stated that for computer technology to be effective, teachers must not be the dispensers of knowledge, instead, they should work with students as teams or groups to achieve a common goal of determining solutions to problem situations. Also, according to Panyan, McPherson, Steeves, & Hummel (1994) teacher preparation is critical and computer integration cannot occur in its absence.

Any technology integration requires teachers to engage in reshaping their curriculum. Several questions emerge as a result such as: What is the relationship between technology and current instructional materials? What does the use of
technology offer students in terms of developing content? How can technology allow students to inquire? How can technology be used both cooperatively, and collaboratively? What skills and knowledge should students have before using technology? What new knowledge of content, the art of teaching, and technology does the teacher need to be successful?

Moreover, many of the technological applications require a broader and deeper knowledge of the discipline than may be required by curricula that assume that teachers transmit a fixed body of knowledge. After studying teachers’ use of an application called “Geometric Supposer”, Wiske (1990), concluded that for teachers to be successful, they must have command of the subject matter, function as a leader and manager of learners, be flexible, and have time for planning throughout the year.

In a national survey of the use and integration of computers in classroom instruction. Becker (1991) stated that teachers who integrated computer technology into their teaching held similar characteristics. Hadley and Sheingold (1993) also reported in a study that focused exclusively on teachers with expert computer knowledge, that there were specific characteristics in place that allowed for an environment conducive to above average use and effectiveness. Both studies identified changeable and unchangeable characteristics. For example, according to Becker unchangeable characteristics include amount of computer experience, amount of teaching experience, gender, and age. Hadley and Sheingold stated that although the amount of computer experience could be considered changeable. Teachers with little computer expertise typically used them for drill and practice and did not appear to change instructional delivery methods. In addition, teachers experienced in the use
of computers were able to change their methods of instruction to accommodate the integration of computers effectively. More often than not, these studies found that teachers with a high level of expertise in the use of computer technology utilized small group activities with resultant student-centered products as the main focus of their lessons.

The reported changeable characteristics were numerous. For example, teachers who used computers effectively in classroom instruction have building level support, local administrative support, classroom access to computers, as well as computer labs that are maintained and staffed to ensure an additional support structure (Hadley & Sheingold, 1993; Vockell & Sweeney 1994). In addition, Becker (1994) stated that low student to computer ratio, organized and sustained staff development, and internal support by building level computer staff are essential to allow teachers opportunity for higher level use of technology within classroom instruction. Moreover, Becker also found that the primary factor that determines the differential between common drill and practice and higher level integration and delivery methods in instruction is the support structure among peers. Without the internal support among and between teachers as teams, higher level integration does not appear likely to occur with any degree of regularity.

In addition, according to Vockell and Sweeney (1994) teachers who used computers at a higher level of instructional methodology appeared to view computers as integral to the act of teaching and thought of themselves as having an above average level of expertise in the use of technology. Also, Hadley & Sheingold (1993) reported that teachers who effectively use computers as a tool for instructional
integration, appear to be actively involved in professional development that is technology-related.

These same studies also determined factors that were not influential to the integration of computer technology in classroom instruction. For example, Becker (1994) found that disparity among schools and school divisions did not play a significant role in the use of computer technology in classroom instruction. Likewise, Hadley & Sheingold (1993) stated that teachers in schools with high socio-economic status alone did not integrate computer technology into their instruction any more than their counterparts in schools of lesser socio-economic status.

According to Newman (1992), although teacher designed, computer-enhanced curricula can have substantial impact on motivation and learning, they require advanced skills in curriculum and instruction, team building, interdisciplinary design, and the appropriate use of technology on the part of the teachers. When teachers develop and integrate technology into the curricula their roles transform to that of coach and facilitator. For teachers to follow multiple routes to knowledge-making, a curriculum needs to be flexible. Newman stated that teachers should not expect to have total grasp of the content related to every topic. Instead, teachers do need to know how to help guide students through the process of making content meaningful. This shift from the more comfortable role of transmitters of knowledge to facilitators of independent inquiry often leaves teachers with a feeling of vulnerability. In addition, many technology applications offer teachers a window into the students' thinking, inquiry, and problem-solving processes. In addition, when students use computer technology, teachers have access to students' misconceptions, how they sort
and categorize information, the relationships they form from ideas, and the conjectures they make. With that, teachers need good diagnostic skills to take advantage of the opportunities provided by the technology.

The literature reveals a theoretical connection between the effective use of computer technology in classroom instruction and restructuring (Becker, 1994; Maddox, 1997; Vanderpan, 1995). That connection is that the classrooms are ones in which student groups work on long-term, multidisciplinary projects that involve challenging content that is interesting and meaningful. Also, teachers must have a command of their area of expertise along with a substantial knowledge base in the use of computer technology in instruction. Becker (1994) noted that technology cannot become a meaningful support for students' work if they have limited access. Technology-based project oriented instruction, which is advocated for effectiveness, requires a high level of access to the type of tools that researchers and other professionals use on a daily basis. According to Becker, most schools reported word processing as one of the most prevalent uses of computers across grade levels. In many cases, students do very little composition on computers. Instead, they were entering drafts that were composed initially using paper and pencil, leaving the computer as a tool for editing and publishing. Lack of access appeared to be the critical factor, particularly at sites where computers were located in separate laboratories, or where there were few computers in individual classrooms.

According to Wiske (1990), one of the major decisions schools embarking on the implementation of technology must make is whether to group computers in separate laboratories which allow whole classes to work individually, or to disperse them among
individual classrooms. Newman (1992) noted that distributing computers among regular classrooms does get the technology where the students are located. But, if the schools do not have enough computers to provide a critical mass within classrooms, little benefit is likely to result. Also, and in particular, a uniform distribution formula that allocates one, two, or even four computers in every classroom was found to be ineffective. According to Newman, a small number of computers do not provide individual students or small groups with enough time to have a positive impact.

The literature has exposed an interesting dilemma with regard to the process of educational change, restructuring initiatives, and attempts to integrate computer use in classroom instruction. First, restructuring in most cases allows for enhanced teacher decision making, as in the case of site-based managed schools. However, this bottom up approach contraindicates adoption, initiation, and implementation of new initiatives, especially those decided by teachers. Yet, one of the assumptions of restructuring is to empower teachers to make professional decisions, take ownership for those decisions, and engage in their implementation and continuation. Second, according to the literature, higher level administrative decisions are initiated, implemented and continued under specific circumstances. This leads to a paradox of sorts in that empowerment from restructuring allows for innovation and change only with adequate support. But adequate support typically does not exist without high level administrative involvement in the decision making process (Fullan 1991). Moreover, the factors of opportunity, skill, self-efficacy, and support appear critical.
Critical Summary

Further research on the use and integration of computer technology in classroom instruction appears to be highly recommended. The emerging theme with regard to the use of technology in classroom instruction involves two distinct categories: 1) The process of change and its effect on performance related factors and 2) Factors of leadership, restructuring and their relationship to performance. From the literature, it is clear that further research is critical. Schools have been in the process of restructuring for at least the last five years. Many schools have implemented more than one form of restructuring. In addition, and since this process began, some 38 states across the country have adopted state standards, many of which include computer literacy for both students and teachers. These facts alone prove the worthiness of further study into the arena of school change and the integration of technology in instruction.

In conclusion, the area of restructuring and change is very broad, almost all encompassing. It is necessary therefore to focus attention onto one aspect of this phenomenon. The literature does demonstrate that there are organizations that have implemented computer technology into the classroom. In addition, there are organizations that have been unable to effectively accomplish that same goal. Why then have some organizations been successful where others have not? The focus of this study is to determine what factors facilitate and what factors inhibit the use and integration of computer technology in classroom instruction. Based on the review of the literature, it appears that further study of the change process and leadership as it relates to the integration of computer technology is called for.
Chapter 3: The Research Design

The purpose of this study was to determine the factors that inhibit and the factors that promote the integration of computer technology in classroom instruction.

**Research Questions**

1. What is the present level of computer technology integration in classroom instruction at selected public middle schools in Virginia?
2. What are the institutional, conceptual, and personal factors that inhibit or enhance the implementation of computer integration?

**The Sample**

The setting for this study included three middle schools in a public school division in central Virginia. This division has in place an ongoing restructuring process for middle schools, and in 1995 implemented a multi-million dollar computer initiative. The sample was comprised of the entire teaching faculty and the building principals of the three schools. A stipulation in allowing the researcher to use this school division for data collection was to maintain a degree of anonymity for the division. Therefore, the division name is not used throughout the writing. For purposes of clarity, the school system studied is referred to as the division.

Since within this division there is equitable distribution of technology funds, school location and socioeconomic status of patrons should not have had an influence on the results.

This study did not begin until approval was granted from the School of Education of the College of William and Mary Human Subjects Review Committee. Permission to conduct this study was requested from the Superintendent of this division. When
permission was granted to conduct this study, a letter was sent to building principals of the three selected schools stating the nature of the research and asking permission to query the faculties.

Gathering of Data

Questionnaire

A questionnaire consisting of objective items was used for participant responses. See Appendix A for a copy of the questionnaire. In addition, the instrument was based on the research questions to determine the factors that both inhibit and contribute to the integration of technology in the classroom. The dissertation committee examined the questionnaire for content validity. A memo was read to the faculties in participating sites explaining and requesting participation.

The questionnaire was administered directly after teacher meetings. A minimum of 80% return rate on completed questionnaires was considered acceptable. All questionnaires contained confidentiality, anonymity, and ethical statements. Participants were guaranteed confidentiality and anonymity.

Interview

All faculty members were invited to be interviewed by way of a memo placed into their mailboxes. It was up to each person to contact the researcher, upon which an interview time and place was mutually established. In addition, those who did not participate in the survey, were invited for interview. A minimum of 20% of the faculties was interviewed. The intent of the interviews was to gain insight into emerging themes brought about through analysis of responses to the questionnaires.
A semi-structured interview technique was used to gather data from participants. Fixed response questions, and open-ended questions were constructed. Probes were used as the situation dictated. This allowed the interviewer to be unrestricted with regard to the list of questions, repeat questions, or to move on to tangents that showed promise of providing useful data.

A pilot study was conducted for both the questionnaire and interview protocols in order to establish usability and clarity of the items and to establish interview and coding categories necessary for content analysis. Percentages of faculty members queried mimicked minimal expectations for the larger study.

**Data Gathering Process**

**The Pilot Study**

In gathering the data, a pilot study was conducted prior to data collection at two other schools for two reasons. First, the instruments were developed by the researcher and therefore required analysis as to reliability and validity. Second, a trial of the administration of the instruments was completed in order to determine potential flaws that would disrupt the process. To determine reliability and validity, an item analysis was conducted. The analysis was done by placing percentage values on each item of the questionnaire. In doing so the researcher was able to see a clear picture of patterns that emerged. Based on the percentage values of each item in the questionnaire, it was concluded that the respondents were consistent in their participation and that the instrument did was it was intended to do.

The researcher administered the pilot questionnaire on November 22, 2000. See appendix A for a copy of the questionnaire. The individuals involved in the
administration of the questionnaire included all members of the faculty of Middle School I (MS1). At the request of the division superintendent, all schools used in this study remain anonymous. A letter was mailed to the building principals two weeks prior to the administration date requesting permission to conduct the study as well as information about the study. See appendix B for a copy of the letter to principals. A copy of the informed consent document was included in the communication with the building principal. See appendix C for a copy of the informed consent document. In addition, another letter was mailed to the division superintendent in the weeks prior to communicating with the building principal, again requesting permission to contact the principal, and to utilize that school system for data gathering purposes. See appendix D for a copy of the letter to the superintendent. At the request of the division superintendent, a copy of the approved dissertation proposal was mailed to his office for review. Upon receiving preliminary clearance to proceed, the researcher was visited by an assistant of the superintendent for the purpose of clarifying parameters of the data gathering and its use. Once the parameters for data gathering were agreed to, final approval was granted to proceed with the pilot study as well as subsequent administrations of the instruments.

In administering the pilot study, the researcher asked permission of the building principal to attend a faculty meeting. It was communicated in advance to the principal that at the conclusion of the faculty meeting, an announcement would be made that there was a visitor present who would like to administer a questionnaire to them for the purpose of collecting data needed for a dissertation study. In addition, the faculty was informed by the principal and again by the researcher that their participation in the study
was voluntary. Also, the researcher stated that he would leave the room for a period of one minute in order to allow anyone who desired to leave to do so without feeling threatened. Upon entering the meeting room after the minute elapsed, the researcher was both pleased and surprised to find a large number of participants remaining. Two other schools from the same division were involved in the collection of data. Administration of the collection instrument was replicated in both schools as described in the pilot study.

The researcher stood before the remaining faculty members and read from a document that advised them of informed consent. Upon completion of reading the informed consent document to the faculty, the building principal was asked to sign the document as verification that informed consent was presented. The researcher asked the respondents to read and follow the directions at the top of the questionnaire before starting. In addition, the participants were informed that after handing out the questionnaire, the researcher would exit the meeting room and not re-enter until all present had completed. Also, the participants were asked to place the completed questionnaires face down on a manila envelope located on the lectern. When completed, the researcher entered the meeting room, placed the questionnaires inside the manila envelope and exited the building.

**Data Analysis**

A modified qualitative content analysis of the questionnaire data was used. According to Goetz and LeCompte (1984), qualitative researchers tend to analyze their data inductively. Inductive research begins with a collection of data. These data then are analyzed, and theoretical categories are built and relationships discovered.

Sorting and classifying was conducted until constructs and categories emerged. These results were then reported in narrative form and sorted and reported by essential
research questions. Statements of the interview participants were quoted where appropriate to enhance and enrich the findings.

In descriptive surveys using questionnaires and interviews, the objective is to gather data and information that answers the research question posed. As Fox (1969) stated: "... in educational research there are two conditions which occurring together suggest and justify the descriptive survey: First, that there is an absence of information about a problem of educational significance, and second, that the information does exist and is accessible to the researcher" (p 424). Therefore, both conditions as stated by Fox that justify the use of descriptive methodology were met.

According to Stake (1995), case studies and studies such as this investigation are not sampling research. It was the obligation of this researcher to fully understand the cases studied. While there has been a considerable body of quantified research on this topic, this study attempted to provide deeper understanding of change, and technology. In addition, while case study research will not allow for generalization, valid modification of generalization can occur (Stake, 1995). As mentioned earlier, a dual approach to data collection was used primarily for verification and affirmation, but more importantly, for the possibility of valid modified generalization.

Bias Statement

This school division serves approximately 16,000 students in grades K-12. There were 13 elementary schools, three middle schools, and three high schools. This division is located in central Virginia and is a suburb of the capital city of Richmond. This suburban division presents a wide spectrum in terms of demographics and served well as a study location. The researcher has been employed in this school system for the last year
as a middle school assistant principal. Because he is relatively new to this school system, personal and professional relationships should not impact the findings.
Chapter 4: Results

The purpose of this study was to determine the factors that inhibit and the factors that promote the integration of computer technology in classroom instruction.

Research Questions

1. What is the present level of computer technology integration in classroom instruction at selected public middle schools in Virginia?

2. What are the institutional, conceptual, and personal factors that inhibit or enhance the implementation of computer integration?

Demographics

The school division where the study took place is located in central Virginia and has a current total of 20 schools. There are 13 elementary schools, 4 middle schools with one of the schools currently under construction, and 3 high schools. The elementary schools serve a population of approximately 8,157 students. The middle schools serve approximately 3,996 students, and the high schools serve approximately 4,774 students. The total current student membership for the division is 16,927 students. There are 373 elementary teachers, 217 middle school teachers, and 254 high school teachers.

The ethnic make-up of the division is somewhat diverse. There are 28 American Indians, 166 Asians, 1,612 African Americans, 135 Hispanics, and 14,716 Caucasians. A year 2000 Family Survey revealed that 96% of parent respondents stated that they believe the division offers the kind of education they want for their children. The division also received the "Expansion Management Gold Award" which reflects a level of quality attractive to corporate interests.
In addition, six schools have earned the U.S. Department of Education Blue Ribbon School of Excellence designation. The school division’s drop-out rate is receiving statewide attention in that it is the lowest rate in the state at 0.3%. Student performance for this division on the state SOL tests exceeded the state average on 25 of 26 test areas and served to maintain a top 10% performance standard. In advance of the state mandated year 2006 timeline for accreditation, half of the division’s schools have earned full accreditation. All other schools in the division are provisionally accredited.

All schools are comparable in student achievement, community involvement, and safety. Eighty three percent of all graduates continue their education at two or four-year colleges and universities. This division was the first in the state of Virginia to receive the United States Senate Productivity and Quality Award for Continuing Excellence. Over 4,100 parent and community volunteers contributed 115,620 hours to the division schools in the last year.

Table 1 shows that the school division has about 5 computers for each classroom, over three hundred computers per school, and averages 3.5 computers per student.
Table 1: Computer Distribution

<table>
<thead>
<tr>
<th></th>
<th>School 1</th>
<th>School 2</th>
<th>School 3</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Computers per classroom</td>
<td>4</td>
<td>5</td>
<td>5</td>
<td>14</td>
</tr>
<tr>
<td>Computers per school</td>
<td>338</td>
<td>380</td>
<td>380</td>
<td>1098</td>
</tr>
<tr>
<td>Computer labs</td>
<td>2</td>
<td>1</td>
<td>1</td>
<td>4</td>
</tr>
<tr>
<td>Computers per student</td>
<td>3.8</td>
<td>3.3</td>
<td>3.5</td>
<td>10.6</td>
</tr>
<tr>
<td>Total number of teachers</td>
<td>84</td>
<td>82</td>
<td>86</td>
<td>252</td>
</tr>
<tr>
<td>Participants in the study</td>
<td>65</td>
<td>66</td>
<td>72</td>
<td>203</td>
</tr>
</tbody>
</table>

Data Analysis - Questionnaire

The questionnaire was constructed for the purpose of answering two principal research questions: what are the factors that facilitate and what are the factors that inhibit the integration of computer technology in classroom instruction? In order to arrive at a potential answer to that question, two subsidiary questions emerged: What is the present level of computer technology integration in classroom instruction at several public middle schools in Virginia? What are the institutional, conceptual, and personal factors that inhibit or enhance the implementation of computer integration? Questions 1-13 of the questionnaire address the first subsidiary question, and questions 14-25 address the second subsidiary question.

Tables were constructed for each reporting category for the purpose of describing present levels of integration in classroom instruction, as well as the institutional,
conceptual, and personal factors that inhibit or enhance that integration. Mean percent values were calculated for each reporting category based on responses.

In Table 2, a majority of the respondents reported that they use computers as part of their lessons on a monthly basis. The use of computers in classroom instruction on a daily and weekly basis was considerably less.

Table 2: Use Computers as a Part of My Lessons

<table>
<thead>
<tr>
<th>Question 1</th>
<th>Daily</th>
<th>Weekly</th>
<th>Monthly</th>
<th>Annually</th>
<th>Never</th>
</tr>
</thead>
<tbody>
<tr>
<td>N = 203</td>
<td>12%</td>
<td>27%</td>
<td>52%</td>
<td>5%</td>
<td>3%</td>
</tr>
</tbody>
</table>

Table 3 illustrates how those who do integrate computer technology in classroom instruction proceed. Interestingly, drill and practice integration appears split with the majority indicating infrequent use of this particular method.

Table 3: Use Computers for Drill and Practice of Lessons Already Taught

<table>
<thead>
<tr>
<th>Question 2</th>
<th>Daily</th>
<th>Weekly</th>
<th>Monthly</th>
<th>Annually</th>
<th>Never</th>
</tr>
</thead>
<tbody>
<tr>
<td>N = 203</td>
<td>5%</td>
<td>13%</td>
<td>33%</td>
<td>16%</td>
<td>33%</td>
</tr>
</tbody>
</table>

The question of computer integration for remediation purposes was asked and is illustrated in table 4. Again, as in table 3, a similar pattern emerged based on mean
percentage values of the responses. An almost equal percentage of respondents appear split between monthly and no use of computers for remediation.

Table 4:1 Use Computers for Student Remediation.

<table>
<thead>
<tr>
<th>Question 3</th>
<th>Daily</th>
<th>Weekly</th>
<th>Monthly</th>
<th>Annually</th>
<th>Never</th>
</tr>
</thead>
<tbody>
<tr>
<td>N = 203</td>
<td>12%</td>
<td>12%</td>
<td>29%</td>
<td>16%</td>
<td>31%</td>
</tr>
</tbody>
</table>

With regard to the question of using computer time as a reward mechanism, an overall majority of the respondents as indicated by the data use computers for this purpose on a weekly basis. Table 5 illustrates that some teachers feel comfortable in using them as a reward incentive.

Table 5:1 Use Computers as Reward Incentive for Work Completed.

<table>
<thead>
<tr>
<th>Question 4</th>
<th>Daily</th>
<th>Weekly</th>
<th>Monthly</th>
<th>Annually</th>
<th>Never</th>
</tr>
</thead>
<tbody>
<tr>
<td>N = 203</td>
<td>14%</td>
<td>42%</td>
<td>17%</td>
<td>7%</td>
<td>20%</td>
</tr>
</tbody>
</table>

Table 6 illustrates the degree that teachers place on the use of computer technology for the completion of papers or special projects as a requirement of their students. The mean percentage value from the data indicate that 75% of the teachers require this on a limited basis.
Table 6:1 Require Papers/Projects to be Word Processed on Computer.

<table>
<thead>
<tr>
<th>Question 5</th>
<th>Daily</th>
<th>Weekly</th>
<th>Monthly</th>
<th>Annually</th>
<th>Never</th>
</tr>
</thead>
<tbody>
<tr>
<td>N = 203</td>
<td>12%</td>
<td>13%</td>
<td>26%</td>
<td>21%</td>
<td>28%</td>
</tr>
</tbody>
</table>

Question 6 was designed to determine the use of other forms of software teachers require their students to use as part of classroom instructional practices. From the data, it is evident that students are not required to create presentations with the integration of computer presentation software on any regular basis. The results are in Table 7.

Table 7:1 Require Presentations to be Made Using Power Point Software.

<table>
<thead>
<tr>
<th>Question 6</th>
<th>Daily</th>
<th>Weekly</th>
<th>Monthly</th>
<th>Annually</th>
<th>Never</th>
</tr>
</thead>
<tbody>
<tr>
<td>N = 203</td>
<td>0%</td>
<td>0%</td>
<td>15%</td>
<td>23%</td>
<td>62%</td>
</tr>
</tbody>
</table>

The issue of requirements placed on students to conduct research on the internet was posed in the questionnaire. The data indicate that this integration of computer technology appears to be accepted practice among the respondents. However, almost a third of the teachers have students using the Internet little or not at all.

Table 8:1 Require Students to Conduct Research on the Internet.

<table>
<thead>
<tr>
<th>Question 7</th>
<th>Daily</th>
<th>Weekly</th>
<th>Monthly</th>
<th>Annually</th>
<th>Never</th>
</tr>
</thead>
<tbody>
<tr>
<td>N = 203</td>
<td>7%</td>
<td>15%</td>
<td>47%</td>
<td>17%</td>
<td>14%</td>
</tr>
</tbody>
</table>
Questions 1 through 7 were constructed and aligned to elicit responses that would potentially provide insight as to the first subsidiary question: what is the present level of computer technology integration in classroom instruction at several public middle schools in Virginia? The data suggest that at the present time, the level of computer integration in classroom instruction remains minimal. Although a combined 91% of the respondents stated that they use computers as part of their lessons at least on a monthly basis, those same respondents reported that the only categories they use computers for is as a reward mechanism and for research on the Internet. Slightly more than half of the teachers, 53% reported using computers for remediation at least on a monthly basis, and 51% reported using computers for drill and practice at least on a monthly basis. Sixty-nine percent of the teachers reported requiring research on the internet, only 51% required papers/projects to be word processed, and only 38% required students to create presentations with current software such as power point.

The second subsidiary research question deals with institutional and personal factors that may enhance or inhibit the integration of computers in instruction. Specifically the question asks; what are the institutional, conceptual, and personal factors that inhibit or enhance the implementation of computer integration? Questions 8-13 of the questionnaire were designed to address the issue of personal factors. Questions 14-19 were designed to provide data specific to conceptual factors, and questions 20-25 addressed the issue of institutional factors and their limitations both positive and negative. Tables were constructed for each question.

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Table 9 addresses the issue of personal use of the computer specifically for professional reasons, specifically student grading. The data indicates that the respondents use computer technology for grading purposes on a limited basis. The highest mean percent of respondents fall in the category of monthly use with all other categories remaining somewhat similar in size.

Table 9:1 Use the Computer for Student Grading.

<table>
<thead>
<tr>
<th>Question 8</th>
<th>Daily</th>
<th>Weekly</th>
<th>Monthly</th>
<th>Annually</th>
<th>Never</th>
</tr>
</thead>
<tbody>
<tr>
<td>N = 203</td>
<td>23%</td>
<td>16%</td>
<td>33%</td>
<td>5%</td>
<td>23%</td>
</tr>
</tbody>
</table>

Table 10 addressed teaching lessons on the computer. A high percentage of respondents reported that they did not use computer technology at all for the purpose of planning their lessons. Again, most of the other reporting categories appear equal in percentage distribution.

Table 10:1 Plan My Lessons on the Computer.

<table>
<thead>
<tr>
<th>Question 9</th>
<th>Daily</th>
<th>Weekly</th>
<th>Monthly</th>
<th>Annually</th>
<th>Never</th>
</tr>
</thead>
<tbody>
<tr>
<td>N = 203</td>
<td>10%</td>
<td>11%</td>
<td>21%</td>
<td>0%</td>
<td>58%</td>
</tr>
</tbody>
</table>

Table 11 combines personal and professional computer use with communication in the form of email. The data indicate a clear shift from very little use as in other categories to substantial use for e-mail communication both personally and professionally. In
addition, the data also show that the high percentage of respondents use email on a daily basis.

Table 11: Use Email to Communicate Both Personally and Professionally.

<table>
<thead>
<tr>
<th>Question 10.</th>
<th>Daily</th>
<th>Weekly</th>
<th>Monthly</th>
<th>Annually</th>
<th>Never</th>
</tr>
</thead>
<tbody>
<tr>
<td>N = 203</td>
<td>66%</td>
<td>17%</td>
<td>11%</td>
<td>6%</td>
<td>0%</td>
</tr>
</tbody>
</table>

Table 12 was displays the personal use of the World Wide Web by the respondents. The data reveal that an overwhelming majority of the respondents, some 90%, use the World Wide Web at least on a weekly basis.

Table 12: Use the World Wide Web

<table>
<thead>
<tr>
<th>Question 11.</th>
<th>Daily</th>
<th>Weekly</th>
<th>Monthly</th>
<th>Annually</th>
<th>Never</th>
</tr>
</thead>
<tbody>
<tr>
<td>N = 203</td>
<td>53%</td>
<td>40%</td>
<td>7%</td>
<td>0%</td>
<td>0%</td>
</tr>
</tbody>
</table>

Table 13 reports on the use of a personal computer at home. The data indicate that there is a high percentage of computer use on a personal level in the home for these respondents.

Table 13: Use a Personal Computer at Home

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>N = 203</td>
<td>70%</td>
<td>26%</td>
<td>3%</td>
<td>0%</td>
<td>1%</td>
</tr>
</tbody>
</table>
Table 14 shows how often respondents update their skills in computer use. The respondents reported that their development occurs on either an annual basis or never.

Table 14: Update My Computer Skills by Attending Classes

<table>
<thead>
<tr>
<th>Question 13</th>
<th>Daily</th>
<th>Weekly</th>
<th>Monthly</th>
<th>Annually</th>
<th>Never</th>
</tr>
</thead>
<tbody>
<tr>
<td>N = 203</td>
<td>1%</td>
<td>3%</td>
<td>5%</td>
<td>72%</td>
<td>19%</td>
</tr>
</tbody>
</table>

The principle research question is: what are the factors that facilitate and what are the factors that inhibit the integration of computer technology in classroom instruction? In order to answer this question, two subsidiary questions were created. Questions 8-13 were directly related to the first subsidiary question which is: what is the present level of computer technology integration in classroom instruction at several public middle schools in Virginia? While there appears to be a high percentage of computer use for personal experiences, there is little evidence that those experiences hold any influence or connection for its use in the workplace.

Questions 14-25 were designed to gain insight as to the institutional, conceptual, and personal factors involved with the use and integration of computer technology in classroom instruction. Specifically, the second subsidiary question is: what are the institutional, conceptual, and personal factors that inhibit or enhance the implementation of computer integration?

Question 14 addressed the issue of administrative and institutional expectations placed on subordinates. The table shows that respondents are aware that they are
expected to use computer technology in their lessons sometimes. A lesser number reported that they are expected to use computer technology in their lessons almost always.

Table 15: The Administration in My School Expects Me to Use Computer Technology in My Lessons

<table>
<thead>
<tr>
<th>Question 14.</th>
<th>Always</th>
<th>Almost Always</th>
<th>Sometimes</th>
<th>Seldom</th>
<th>Never</th>
</tr>
</thead>
<tbody>
<tr>
<td>N = 201</td>
<td>15%</td>
<td>38%</td>
<td>44%</td>
<td>3%</td>
<td>0%</td>
</tr>
</tbody>
</table>

The results of question 15 are located in Table 16. The issue of administrative expectations for long term papers and projects was explored. The data again indicate that a majority of the respondents believe that there are expectations for computer use by students in long-term projects and papers at least some of the time.

Table 16: The Administration In My School Expects Me To Use Computer Technology As Part of Long-Term Student Projects Such as Papers and Reports

<table>
<thead>
<tr>
<th>Question 15.</th>
<th>Always</th>
<th>Almost Always</th>
<th>Sometimes</th>
<th>Seldom</th>
<th>Never</th>
</tr>
</thead>
<tbody>
<tr>
<td>N = 202</td>
<td>12%</td>
<td>35%</td>
<td>35%</td>
<td>12%</td>
<td>6%</td>
</tr>
</tbody>
</table>

The results of question 16 are presented in Table 17. Question 16 addressed the issue of administrative expectations on the maintenance of student grades by teachers on computer. The researcher considers the responses puzzling at best in that the categories
for response were either yes, or no. The data indicate a clear split of responses to this question.

Table 17: The Administration in My School Expects Me to maintain Student Grades on Computer.

<table>
<thead>
<tr>
<th>Question 16</th>
<th>Yes</th>
<th>No</th>
</tr>
</thead>
<tbody>
<tr>
<td>N = 203</td>
<td>44%</td>
<td>56%</td>
</tr>
</tbody>
</table>

Question 17 asked about professional expectations with regard to email communications. The data indicate that a majority of respondents acknowledge there are high expectations from the administration for this form of communication. Table 18 illustrates this finding.

Table 18: The Administration in My School Expects Me to Communicate Professionally with Email

<table>
<thead>
<tr>
<th>Question 17</th>
<th>Always</th>
<th>Almost Always</th>
<th>Sometimes</th>
<th>Seldom</th>
<th>Never</th>
</tr>
</thead>
<tbody>
<tr>
<td>N = 203</td>
<td>48%</td>
<td>33%</td>
<td>19%</td>
<td>0%</td>
<td>0%</td>
</tr>
</tbody>
</table>

Question 18 was designed to determine to what degree or level, the school administrators modeled behavioral expectations of their faculty members through the use of computers in communications. There was a high response that the school administrations use computer technology for communication purposes. Table 19 illustrates the results.
Table 19: The Administration in My School Uses Computer Technology for Communication.

<table>
<thead>
<tr>
<th>Question 18</th>
<th>Always</th>
<th>Almost Always</th>
<th>Sometimes</th>
<th>Seldom</th>
<th>Never</th>
</tr>
</thead>
<tbody>
<tr>
<td>N = 203</td>
<td>51%</td>
<td>30%</td>
<td>19%</td>
<td>0%</td>
<td>0%</td>
</tr>
</tbody>
</table>

The results for question 19 are contained in Table 20. The issue of administrative modeling through the use of computer technology for meetings and presentations was asked. The data indicates that in this form of use, where there is a clear drop as compared to the level of use for communications, administrators do not consistently use computers for presentations.

Table 20: The Administration in My School Uses Computer Technology for Meeting Presentations

<table>
<thead>
<tr>
<th>Question 19</th>
<th>Always</th>
<th>Almost Always</th>
<th>Sometimes</th>
<th>Seldom</th>
<th>Never</th>
</tr>
</thead>
<tbody>
<tr>
<td>N = 203</td>
<td>12%</td>
<td>12%</td>
<td>40%</td>
<td>30%</td>
<td>6%</td>
</tr>
</tbody>
</table>

Question 20 was specifically designed to ride the coattails of the previous question in that when the administration models behavior they expect from their subordinates, do they use and integrate the software that they expect their teachers to use for presentations. The results of question 20 are found in Table 21. The results correlate with the results of the previous question representing presentations.
Table 21: The Administration in My School Models the Use of Computer Technology by Integrating it into Faculty Meetings in the Form of Presentations by Using the Software Teachers are Expected to Use

<table>
<thead>
<tr>
<th>Question 20</th>
<th>Always</th>
<th>Almost Always</th>
<th>Sometimes</th>
<th>Seldom</th>
<th>Never</th>
</tr>
</thead>
<tbody>
<tr>
<td>N = 201</td>
<td>10%</td>
<td>12%</td>
<td>40%</td>
<td>33%</td>
<td>5%</td>
</tr>
</tbody>
</table>

Question 21 attempted to determine the level of decision-making that the administration afforded the teachers with regard to selection and purchase of software. The results of question 21 are included in Table 22. It appears from the data that the teachers are not always included in the process of selection and procurement of software.

Table 22: The Administration Includes Me in Decisions for Software Purchases in My School

<table>
<thead>
<tr>
<th>Question 21</th>
<th>Always</th>
<th>Almost Always</th>
<th>Sometimes</th>
<th>Seldom</th>
<th>Never</th>
</tr>
</thead>
<tbody>
<tr>
<td>N = 203</td>
<td>2%</td>
<td>7%</td>
<td>42%</td>
<td>19%</td>
<td>30%</td>
</tr>
</tbody>
</table>

The results for question 22 are presented in Table 23. Because staff development is a critical aspect of any professional organization, the question was asked with regard to opportunities provided for technology training. The data indicate that there are opportunities made available for teachers to develop their skills in the use and integration of computers.
Table 23: My School Provides Opportunity for Professional Development in the Use of Computer Technology

<table>
<thead>
<tr>
<th>Question 22.</th>
<th>Always</th>
<th>Almost Always</th>
<th>Sometimes</th>
<th>Seldom</th>
<th>Never</th>
</tr>
</thead>
<tbody>
<tr>
<td>N = 203</td>
<td>43%</td>
<td>35%</td>
<td>15%</td>
<td>7%</td>
<td>0%</td>
</tr>
</tbody>
</table>

Question 23 takes the issue of professional development to the next level in that it attempts to determine the content of staff development requiring technology. Specifically, the question asks if professional development includes how to integrate computer technology into classroom instruction. The results are included in table 24.

Table 24: My School Provides Opportunity for Professional Development in the Integration of Technology in My Instruction

<table>
<thead>
<tr>
<th>Question 23.</th>
<th>Always</th>
<th>Almost Always</th>
<th>Sometimes</th>
<th>Seldom</th>
<th>Never</th>
</tr>
</thead>
<tbody>
<tr>
<td>N = 201</td>
<td>23%</td>
<td>35%</td>
<td>38%</td>
<td>3%</td>
<td>0%</td>
</tr>
</tbody>
</table>

The results of question 24 are included in Table 25. This question was designed to determine the level of participation that teachers enjoy and are afforded by the school administrations with regard to the change process. A majority of the respondents, as indicated by the data stated that they are at times included in this process.
Table 25: The Administration of My School Encourages Faculty to Take Leadership in Suggesting Changes

<table>
<thead>
<tr>
<th>Question 24</th>
<th>Always</th>
<th>Almost Always</th>
<th>Sometimes</th>
<th>Seldom</th>
<th>Never</th>
</tr>
</thead>
<tbody>
<tr>
<td>N = 203</td>
<td>24%</td>
<td>23%</td>
<td>34%</td>
<td>19%</td>
<td>0%</td>
</tr>
</tbody>
</table>

The results of question 25 are found in table 26. This question was designed to determine teacher perceptions of the level of administrative support for the integration of computer technology in classroom instruction through the provision of needed resources. The data indicate that 81% of the respondents stated overall, the administrations do support efforts to use and integrate technology by providing necessary resources.

Table 26: The Administration of My School is Receptive to Providing Resources that Promote and Support the Use of Computer Technology in Instruction.

<table>
<thead>
<tr>
<th>Question 25</th>
<th>Always</th>
<th>Almost Always</th>
<th>Sometimes</th>
<th>Seldom</th>
<th>Never</th>
</tr>
</thead>
<tbody>
<tr>
<td>N = 201</td>
<td>33%</td>
<td>40%</td>
<td>23%</td>
<td>4%</td>
<td>0%</td>
</tr>
</tbody>
</table>

The second subsidiary research question asked: what are the institutional, conceptual, and personal factors that inhibit or enhance the implementation of computer integration? Questions 14-19 addressed the aspect of conceptual factors. Questions 20-25 addressed the aspect of institutional factors. Personal factors were addressed in questions 1-13 and corresponding tables.
The data from items 1-13 indicate that while a majority of teachers do use computer technology for personal reasons, there appears to be little carry over to the workplace. For example, 83% of the respondents stated they use email for personal reasons at least weekly. In addition, 93% of the respondents said they use the World Wide Web for personal reasons at least weekly, and 96% stated they use a computer at home. This finding is in contrast to the fact that only 39% of the respondents stated they plan lessons on computer. 18% use them for drill and practice at least weekly. 24% use them for remediation weekly. 25% require papers/projects to be done on computer. 22% use them for research on the internet at least weekly. and only 15% require computer use in the form of presentations by students at least on a monthly basis.

Questions 14-19 addressed the issue of expectations for computer use. The data indicate that expectations for use and integration are construed as being on a limited basis. For example, 44% of the respondents stated that they are expected to use computer technology in their lessons sometimes, while 38% said almost always. With regard to the issue of computer use in the completion of long term papers and projects for students, over 70% of the respondents said this is an expectation. Furthermore, a clear majority of respondents, some 80% stated that their administrations expect them to communicate with computer technology, and model that behavior as well. Therefore, expectations do not appear to be a limiting element.

Finally, questions 20 through 25 addressed the issue of institutional factors. A majority of respondent, some 78% stated that the integration and use of computer technology by administrators at meetings is minimal. Also, 91% of respondents said they are rarely included in decisions about software purchases. The data also indicate that
teachers are afforded opportunity for training and professional development with an
average response of over 60% who said this is available almost always. Further.
respondents are in the majority with 58% stating they are encouraged to take leadership
in suggesting change, and 81% stating that they are provided needed resources at least
sometimes.

Interviews

Interviews were conducted during the week of January 8, 2001. The building
principals of the three schools were contacted by the researcher by telephone. Permission
was asked for the researcher to be provided a copy of the faculty roster from each school.
In addition, the researcher requested a copy of the master schedule from each school in
order to set specific dates and times for potential interviews. A letter was placed in each
teacher's mailbox asking if they would be willing to participate in an interview for this
study. To communicate their response, the researcher asked the teachers to leave their
letter and response in a file folder stationed at the desk of one of the school secretaries.
Surprisingly, there was a high response rate with regard to agreeing to an interview.
Some 26% of the total number of questionnaire respondents (n = 53) agreed to be
interviewed. Twenty percent of the respondents, (n = 41) were actually interviewed.

Interviews were scheduled during the working day on personal planning time for
the teachers. Each interview lasted approximately 15 minutes, and was conducted in a
location selected by the building principal for maximum privacy. Those individuals
scheduled for interview included teachers, and guidance counselors. A semi-structured
interview technique was used to gather data from participants. Fixed response questions,
and open-ended questions were constructed. See appendix E for a copy of the interview
questions. Probes were used as the situation dictated. This allowed the interviewer to be unrestricted with regard to the list of questions, repeat questions, or to move onto tangents that showed promise of providing useful data.

Interview Results and Analysis

Responses to each question of the interview were scripted by the researcher for accuracy. See Appendix E for interview questions and responses.

The field notes were then coded item by item with regard to commonality of phrases and individual words used to describe answers to questions. Three coding categories emerged and were delineated by colored highlighter markers. On completion of coding, the field notes were then chunked item by item for the purpose of attempting to uncover underlying themes that may answer the research questions. The three major categories that emerged were time, access, and support. The categories and themes that emerged are reported in outline form with corresponding summaries.

I. Time

- Planning
- Management
- Coordination
- Immediacy

The issue of planning emerged as a subcategory of time. A typical response was, "There’s not enough immediate access, I only have five computers. It would be nice if I had 20 or 25, that way I could plan my time efficiently." Another stated, "Time in planning as well as the time it takes for the kids to be at the computer are unknowns. It’s really hard to plan for a lesson to run smoothly that way."
The subcategory of management was connected to the issue of planning in that
teachers are most concerned with the actual flow and management of time. Statements
such as “Some students are well versed in computer skills and others are not. I’m not sure
how to make the class run at a pace I want with such diversity.” Another said. “A big
barrier for me is how to make everything fit into the time we have, both for the year and
in individual classes. It’s a time management thing I guess.” Yet another stated. “Trying
to coordinate and manage the class, you know to keep things moving and not take more
time than needed I think are problems.”

A third subcategory that emerged is coordination. Teachers appear to be
somewhat intimidated about how to coordinate access as well as the management of time
for the lessons they teach. For example, one teacher stated, “I don’t have time to
coordinate what software to use, when to use it, and how to access it.” Another stated.
“Trying to put all this stuff together can be a nightmare. I mean you have to be able to
juggle lots of hats, like a master of ceremonies, you have to coordinate lots of things, and
I don’t know if it’s worth the effort.” A third teacher said, “I just don’t have the time to
coordinate all the things that go into having an additional element added to my plate in
planning and delivering lessons for my kids.”

Immediacy emerged as the final subcategory under time. Immediacy refers to access
and use on an almost instantaneous basis. Teachers expressed the need for students to
have access to computers on an equal footing to that of access to their notebooks. For
example, one teacher said, “Every kid should have a laptop to be used in various ways. It
would help kids with fine motor skills, information would be easily accessible, and all
could be done in the classroom all at one time. There would be less break in instruction if
we could immediately go to computers without disruption.” Another teacher stated, “I
would want a computer at every desk, and a big screen for me to use. That way, I could
have my students take out their computer just like they take out their notebooks. it should
be quick”…”

Summary

The first major category that emerged from the responses was time. The most
striking aspect reported was not the time to actually use and integrate the machines.
rather, the part of time involving structure. For example, teachers reported that they have
calls about how smoothly their lessons flow so as to not upset their planned
execution. In addition, respondents appeared in agreement that coordinating lessons, and
being consistent with how the machines are used plays a role as barriers.

Further, in planning their lessons, teachers responded that they were reluctant to
allocate a lot of class time to computer integration due to the lack of immediate access.
The respondents reported that they were unclear how to maintain classroom structure and
order when all students could not access computers at the same time. Therefore, time
management clearly emerged as a theme.

II. Access

- Laptop

- Their Own

The second major category of access has three subcategories that emerged from the
data. The word laptop was stated in a majority of the responses. For example, one
teachers said, “All the students should have a laptop, otherwise, you have a hard time
with getting the computer lab, and it can be really hard to use computers in the classroom
when we only have five of them and 25 students.” Another stated, “In a perfect world, we
would have one laptop computer for each child. That way, they would be easily
accessible, and I wouldn’t have to worry about what the other students are doing while
five are on the computer.” In addition, there were multiple responses that used “their
own” as the major focus of the statement. For example, one teacher said: “If these kids
had their own computers, we wouldn’t have to be concerned about the amount of time it
takes from the day just to get to them, let alone use them.” Another said, “I would love it
if each child had their own computer, then it would be easier to plan and coordinate when
and how to best use them in my lessons."

Summary

The second major category that emerged was that of access. The themes that
subsequently emerged from there all indicated the desire for more machines. For
example, a common statement was “we really need a laptop for every student”, and “the
first thing I would do is have a computer for each student and each desk.” In addition,
respondents reported that not only is access important, but the speed of access is critical.
Also, and as part of the access issue, respondents stated that they found it
challenging to work it out so that all students have equal access to computers, almost to
challenging.

III. Support

- Sysops (Systems Operation Specialist)

- Training

The third major category, being support, resulted in the emergence of two
subcategories. Sysops, which refers to the system operations specialist, and training. The
respondents were highly complimentary of the Sysops with statements such as, “Our Sysops Mary is a great support for us, at least me. She always knows what to do and you can count on her.” Another teacher stated, “I wish we could clone Mary, she’s our Sysops, she’s wonderful. If you ever need help with anything with the computer, she knows what to do. I don’t think I could use them at all without her support.”

The second subcategory of training emerged under the category of support. Surprisingly, the issue is training in the ability of teachers to be able to go into the control panels of their classroom computers and reconfigure settings without having to either bother or wait for the Sysops to do that for them. For example, one teacher stated, “Our Sysops is very available most of the time, but it seem like right when you’re in the middle of a lesson, something happens and I have to wait for Mary. Well, there goes the lesson. I wish we were trained to fix our own computers so we wouldn’t worry about that.” Another teacher said, “The Sysops is very helpful, but there have been times when I have had a problem and she’s working in another classroom. You can’t sit there and hope she comes in soon. I’ve watched her in the past and I know if I had a little training I could probably fix my own computers.”

Summary

The third major theme involved that of support. By support, respondents were clear in stating that while there is a designated Systems Operations Specialist (Sysops) in the building at all times, there are times when their services are unavailable at the specific time needed. From that, an additional subcategory emerged where respondents questioned why they were not simply trained to be able to trouble shoot the computers on their own, thus avoiding down time in waiting for the specialist.
Chapter Summary

Questions 1 through 7 were constructed and aligned to elicit responses that would potentially provide insight as to the first subsidiary question: what is the present level of computer technology integration in classroom instruction at several public middle schools in Virginia? The data suggest that at the present time, the level of computer integration in classroom instruction remains minimal.

Although a combined 91% of the respondents stated that they use computers as part of their lessons at least on a monthly basis, respondents also reported that the only categories they use computers for is as a reward mechanism and for research on the internet. Slightly more than half of the teachers, 53%, reported using computers for remediation at least on a monthly basis, and 51% reported using computers for drill and practice at least on a monthly basis. Sixty-nine percent of the teachers reported requiring research on the internet, only 51% required papers/projects to be word processed, and only 38% required students to create presentations with current software such as Power Point.

The data from items 1-13 indicate that while a majority of teachers do use computer technology for personal reasons, there appears to be less carry over to the workplace. For example, 83% of the respondents stated they use email for personal reasons at least weekly. In addition, 93% of the respondents said they use the World Wide Web for personal reasons at least weekly, and 96% stated they use a computer at home. This finding is a stark contrast to the fact that only 39% of the respondents stated they plan lessons on computer, 18% use them for drill and practice at least weekly, 24% use them for remediation weekly, 25% require papers/projects to be done on computer.
22% use them for research on the internet at least weekly, and only 15% require computer use in the form of presentations by students at least on a monthly basis.

Questions 14-19 addressed the issue of conceptual factors. The data indicate that conceptual factors tied to expectation for use and integration are construed as being on a limited basis. For example, 44% of the respondents stated that they are expected to use computer technology in their lessons sometimes, while 38% said almost always.

With regard to the issue of computer use in the completion of long term papers and projects for students, over 70% of the respondents said this is an expectation. Furthermore, a clear majority of respondents, some 80% stated that their administrations expect them to communicate with computer technology, and model that behavior as well. Therefore, conceptual factors do not appear to be a limiting element.

Finally, questions 20 through 25 addressed the issue of institutional factors. A majority of respondent, some 78% stated that the integration and use of computer technology by administrators at meetings is minimal. Also, 91% of respondents said they are rarely included in decisions about software purchases. The data also indicate that teachers are afforded opportunity for training and professional development with an average response of over 60% who said this is available almost always. Further, respondents are in the majority with 58% stating they are encouraged to take leadership in suggesting change, and 81 % stating that they are provided needed resources at least sometimes.

Further, based on the literature review, respondents were clear that without time, access, and support, computer technology integration would not be a part of their lessons. Respondents stated that they need time to plan and research software. Also, the
respondents stated that they were uneasy about how to manage time during lessons given lack of access for all students, as well as potential impending malfunction of software and/or hardware that they are unable to correct without assistance. Respondents were clear that they need training in how to correct computer problems in the classroom themselves so as to be able to manage time during lessons more efficiently. Also, without access to computers for all students at the same time, respondents were again fearful of time management during lessons.
Chapter 5: Summary, Conclusions, Implications, and Recommendations

A summary of the study is presented which restates the problem and research questions, describes the procedures, and draws conclusions based on the findings. An interpretation of those conclusions lays the groundwork for discussing implications for educational practice in the integration of computer technology in classroom instruction. Finally, recommendations are presented for ways the study can be improved, and suggestions are made for further research.

Statement of the Problem

What are the factors that contribute to computer technology integration in classroom instruction, and what are the factors that inhibit computer technology integration in classroom instruction?

Two questions guided the research:

1. What is the present level of computer technology integration in classroom instruction at several public middle schools in Virginia?
2. What are the institutional, conceptual, and personal factors that inhibit or enhance the implementation of computer integration?

The study consisted of a fixed response questionnaire and semi-structured interview technique to gather data. Three schools were selected for the study based on the strength of their reputations for the integration of computer technology in classroom instruction. All faculty members were invited to participate in the research.

Content analysis was used to sort and classify constructs and categories of interviews, while item analysis of the questionnaire was used and reported as percentage responses.
Percentages were used to consolidate and identify patterns in the data. Observations made by the interview participants were quoted where appropriate to highlight and enrich the quantitative findings. The objective of the study was to develop a hypothesis concerning what factors inhibit, and what factors enhance the integration of computer technology in classroom instruction.

**Limitations of the Study**

1. Sample size and representation of the sample may effect generalization of the study.
2. The reliability of instrumentation to measure the variables in the study.
3. The ability of the researcher to conduct interviews that were fruitful and productive.

**Conclusions**

The first research question asked: what is the present level of computer technology integration in classroom instruction at several public middle schools in Virginia? The answer to the first research question is; the level of computer integration in instruction appears to be dependent upon several factors.

The first factor is time. According to the data, teachers remain concerned with the amount of time it takes to plan a lesson with computer integration. The time factor was evident in the responses teachers gave as to not having time to research the massive amounts of information available. In addition, the data indicate that there remains genuine concern for structure and order. Structure with regard to how to design a lesson or lessons that have some logical order, how to have in place equality of access, and how to transition to and from computer integration to other aspects of the lessons. Baker (1990) and Chopra (1994) stated that preparing teachers to perform specific tasks is first
and foremost. Further, Kinnaman (1990) stated that specific task preparation for teachers with 15 or more years of experience who do not possess computer skills is critical.

Also, teachers expressed through the data that there are two types of coordination issues that inhibit their willingness to plan computer integration as part of their lessons. First, they are unclear as to how to integrate computer technology on a daily basis. Teachers do not appear to view the computers they have available as tools. Rather, they have the perception that computers are more of a reward mechanism on a daily and/or weekly basis, and that true integration can only take place for longer term papers or projects that may require the use of software that makes typing or presentation both easier and possible. Again, the critical factor of time has resurfaced within the subcategory of coordination. According to Riel (1990), the use of computers in classroom instruction requires teachers to establish strategies for time allocation, student access of the technology, and techniques for managing technology-based instruction. To be effective, these decisions must be connected to curricular issues and intended student outcomes.

Moreover, there was great concern for what teachers have experienced in the past with problems within the equipment and support mechanisms themselves. A majority of the respondents expressed trepidation with integration in that at any moment in time the file server for the entire building may be inoperative. The fact that this did and could occur at any time without warning, has placed a genuine fear in teachers as to what to do for backup and how to maintain the integrity their lessons. The factor of time again appeared in this subcategory also in that teachers worry that in the event of mechanical failure, students would in all likelihood receive unequal time with the machines for the intended purposes.
Immediacy of use was another factor that appeared a majority of the time in both the questionnaire and interview responses. Teachers stated that they need freedom of use. This freedom was further defined in the interview responses as having enough computers for all students so that teachers could be free to be spontaneous, as in a teachable moment, or to be able to plan with confidence that the plans would be brought to fruition.

Freedom of use also encompasses the aspect of coordination. Respondents were quick to point out and indicated in the data that having to coordinate the integration of the machines into lessons, and to have to coordinate with colleagues the accessibility of enough machines to allow students equality of time is both cumbersome and prohibitive.

The second major category is access. Again, there was a general consensus that without one computer for each student, equality of use was questionable. The issue of equality of use is important for teachers in that there is a concern with regard to grading and treating their students in a fair manner. Teachers envision potential problems with fairness in grading that they would rather avoid without equal access. This is supported in Newman (1992), who stated that distributing computers among regular classrooms does get the technology where the students are located. However, if schools do not have enough computers to provide a critical mass within classrooms, little benefit is likely to result. A small number of computers do not provide individual students or small groups with enough time to have a positive impact.

In addition, another time related factor plays a role with access of computers; that being immediacy of access for both planned and unplanned lessons or integration. The data are clear and indicate that teachers want more and smaller machines, as in the
current laptop computers, and they want one for each student, just as each student has a notebook.

The category of support reveals a somewhat surprising result in that teachers appear to want additional training, in the area of trouble-shooting and repair of the operating system and software. The data indicate that teachers are happy with the fact that there is a person in each building designated for computer support. However, the data also indicate that one support person cannot accommodate the needs of the faculties as they would like. While there is praise for the efforts of the computer support personnel, there is equal concern as to their availability on an immediate basis. The data indicate that teachers want additional training in trouble shooting their own computers so that they have some degree of confidence that down time would be minimal at best. Again the factor of time appears to play a critical role as an inhibiting factor for computer integration. Maddox (1997) noted that teachers are one of the few groups of professionals without a technology enhanced support infrastructure. Physicians, engineers, and lawyers rely heavily on support in the use of technology that allows them to access and assimilate massive databases. It is unlikely then that teachers, without support, will develop sufficient interest in technology that would lead to trial, evaluation, and use in the classroom (Rakestraw, 1997).

The data indicate that the answer to the first subsidiary question; "What is the current level of computer integration in classroom instruction in several Virginia middle schools," appears to be minimal. This result is consistent with the literature and reflects the need for teachers as a group to maintain structure and order, equality and fairness for students, confidence in accessibility, and uninterrupted use.
The issue of the second subsidiary question involves three separate categories, personal factors, conceptual factors, and institutional factors. Specifically, the question asked; “What are the personal, conceptual and institutional factors that inhibit and enhance the integration of computer technology in classroom instruction”?

The data reveal that computer technology is used at a high level by teachers for personal use. A high percentage of respondents, between 53%-70% indicated that they use a personal computer for email communication, and world-wide-web research on a daily basis. Respondents however do not appear to use computer technology for their professional work, in the form of lesson plans, and student grading. It appears clear that the technology is used for personal endeavors, but rarely for professional purposes.

The data indicate that from a conceptual standpoint, there appears to be ambiguity. For example, respondents were asked for a simple yes or no answer when asked if they are expected to maintain student grades on computer. Forty four percent of the respondents said yes, they are expected to maintain student grades on computer, while 56% of the respondents said they are not expected to maintain student grades on computer. Further exploration of this question in the interviews revealed that teachers appear to view expectations in different ways. Some indicated that expectations to use computers for student grading are considered an extra with the old fashioned green grade book as the official record, while other teachers view the same expectation as a directive that must be done regardless of feelings or expertise. Similar results were obtained by Ely (1997) that in order for the use and integration of technology to play an important role in schools, expectations and purpose must be clear and understandable. In addition, Easdown (1996) stated that teachers often do not know what they are expected to
accomplish with technology, that technology may not speak directly to specific needs, or even offer an advantage over the status quo.

In addition, and according to the data, these same views appear to influence other administrative expectations as well. For example, when asked if the administration expected teachers to integrate computer technology in their lessons, 44% responded with sometimes, and 38% said almost always. When asked if there are administrative expectations to integrate computer technology in long term student papers and projects, 35% said sometimes, and 35% said almost always. Along with expectations, the issue of administrative modeling was raised, and respondents said that their respective administrations did indeed model the integration of computer technology either almost always, or always in the form of professional communications, and presentations at faculty meetings. This is supported in (Means et al., 1995), that administrators should lead by learning and using new technology as an example for their faculties.

Clearly, from the data, one can easily glean that while there is a set of guidelines in place with regard to professional expectations for computer integration, teachers appear to choose the definition of the word expectation that best suits their individual needs. Therefore, there is a fairly high degree of ambiguity with regard to the guidelines designed and modeled by the administrations. On the surface, there appears to be nothing ambiguous about the stated expectations by the administrations as to how and why computer technology should be used. However, the data indicate that the apparent ambiguity of conceptual factors plays a role in inhibiting the integration of computer technology in classroom instruction. This is supported in Coombs (1988), who stated that conceptual barriers include poor problem definitions that result in ambiguity of response.
The final factor of the second subsidiary question deals with the aspect of institutional support. Again, respondents stated that in some aspects of institutional support, that support is there sometimes. For other aspects of institutional support, respondents said that it is there almost always or always. For example, when asked if they are included in decision-making for software purchases, a majority of the respondents said either sometimes, seldom, or never. When asked if the schools provided needed professional development for the use and integration of computer technology, respondents overwhelmingly said yes by stating either almost always or always. In addition, respondents said that they receive administrative support a majority of the time with regard to resources needed, and in approaching the administration to make changes in practice.

It appears that teachers are trained and capable of using and integrating computer technology. Their choice as indicated in the data is to use computer technology for personal business as opposed to professional business. Also, there appears to be a high degree of institutional support for the teachers to allow them opportunity to use and integrate computer technology in their classroom instruction, but they don't.

Conceptual factors however, appear to play an extinguishing role in regard to use and integration of computer technology. From the data, it is not clear why some teachers choose to define administrative expectations differently than others. One can only guess that unless the conceptual factors enhance personal gain, they will not influence use and integration. It is clear that there appears to be a degree of ambiguity with regard to administrative expectations and teacher role in executing those expectations. Therefore, and to answer the second subsidiary question, while personal factors of accessibility and
personal use, appear strong, and institutional factors of support, professional
development, and expectations are in place, the perceived ambiguity of conceptual
factors appears to negate what enhances professional use and integration.

Finally, it must be noted that this research supports the assertions of Ertmer (1999),
and Means (1994), that first and second-order barriers to the successful integration of
computer technology in classroom instruction do exist, and without dialogue as to the
role of computer technology in school reform, meaningful change will not result.

Implications and Recommendations for Practice

Several points concluded in this study may affect education policy and practice. First,
as the intended use and integration of computer technology spreads throughout schools,
and as the users develop sophistication in computer use and integration, administrators
should shift their attention, including human and financial resources, to address the
critical factors of time, access, support, and the conceptual framework used to delineate
expectations.

In order for teachers to put forth the effort to integrate computer technology into their
daily lessons, they need the time it takes to research and select appropriate resources and
design new lessons. In addition, teachers need a sense of consistency and structure within
their lessons, again alluding to time, and it’s management. Also, without enough
computers in place to allow for immediate access, planned or unplanned, and specifically
laptop computers, integration and subsequent use as a part of lessons on a daily basis is
remote. Support through the inclusion of building level technical personnel serves to
enhance the prospect of computer integration, however immediate availability is not
possible and a barrier to integration. Administrators should rethink the issue of training
for teachers and implement additional staff development with a focus on computer repair and trouble shooting.

In addition, administrators should rethink their planning efforts for the improved use of technology. Throughout the interview process, there was never a mention of any type of long-range plan or process. Also, there is no evidence of long-range planning efforts in the literature. Therefore, it is difficult to determine if the absence of long-range planning for technology integration in instruction is different from the absence of long-range planning in other areas of instructional practice.

Possibly, short-range, two-year instructional technology improvement plans are in order. Not only is it difficult to predict what technology to use in a rapidly changing market, it is also difficult to predict the effects technology will have on the outcomes of an integrated instructional process.

Perhaps having an integrator at the building level is needed. Administrators could identify, develop, and promote the integrator’s role. In addition, administrators should ensure that short-term technology integration improvement plans are in agreement with goals, and missions of the individual schools, and the division. There is little hope for successful integration of computer technology in classroom instruction if goals and mission statements are disregarded and the barriers to integration are not removed.

**Recommendations for Future research**

One limitation of this research was the fact that the researcher had a strong disposition toward using computers which may influence his interpretation of the data. However, care was taken to chunk and code the interview responses without elaboration. In addition, a self-designed questionnaire that had not been tested in previous research
was used. Therefore a pilot of both instruments was conducted to make the instruments as reliable and valid as possible.

An item that may improve the research instruments concerns the effect of short-range planning on the improved use of computer technology in classroom instruction. Inclusion of this item would enrich the study by adding valuable data related to the planning and decision-making processes in secondary education.

In conclusion, many related research issues are worthy of study. For example, research that determines how institutional goals and division missions affect technological integration would add insight necessary for designing effective computer-related improvement plans. Further, a study that identifies the characteristics or behaviors of people who hold a positive predisposition concerning the integration of technology in instruction may suggest a list of criteria that, when fostered, would help improve the integration of technology in secondary schools. An additional research topic may include a focus on the differences between personality types in their use, confidence, and attitudes concerning the use and integration of computers in instruction. Perhaps understanding distinctive thought processes could lead to changes in training, support, and time management, as well as to an increased integration of technology in instruction.

Finally, further study in the efficient use of time, and the management of time that would allow teachers the flexibility, structure, and order they indicated is imperative to the integration of computer technology in classroom instruction and would be beneficial.
Appendix A

Research Questionnaire
Research Questionnaire

Please respond to the following questions by circling the appropriate letter that corresponds with your choice.

Response Choices:

1.) I use computers as a part of my lessons.
   A  B  C  D  E

2.) I use computers for drill and practice of lessons already taught.
   A  B  C  D  E

3.) I use computers for student remediation.
   A  B  C  D  E

4.) I use computers as reward incentive for work completed.
   A  B  C  D  E

5.) I require papers/project reports to be word processed on the computer.
   A  B  C  D  E

6.) I require presentations to be made using power point software.
   A  B  C  D  E

7.) I require students to conduct research on the Internet.
   A  B  C  D  E

8.) I use the computer for student grading.
   A  B  C  D  E

9.) I plan my lessons on the computer.
   A  B  C  D  E

10.) I use email to communicate both personally and professionally.
    A  B  C  D  E

11.) I use the World Wide Web.
     A  B  C  D  E

12.) I use a personal computer at home. (Never, if you don’t have one.)
     A  B  C  D  E

13.) I update my computer skills by attending classes.
     A  B  C  D  E
Research Questionnaire

Please respond to the following questions by circling the appropriate letter that corresponds with your choice.

Response Choices:

<table>
<thead>
<tr>
<th>A) Always</th>
<th>B) Almost Always</th>
<th>C) Sometimes</th>
<th>D) Seldom</th>
<th>E) Never</th>
</tr>
</thead>
</table>

14.) The administration in my school expects me to use computer technology in my lessons.
   A B C D E

15.) The administration in my school expects me to use computer technology as part of long-term student projects such as papers and reports.
   A B C D E

16.) The administration in my school expects me to maintain student grades on computer.
   A) Yes B) No

17.) The administration in my school expects me to communicate professionally with email.
   A B C D E

18.) The administration in my school uses computer technology for communication.
   A B C D E

19.) The administration in my school uses computer technology for meeting presentations.
   A B C D E

20.) The administration in my school models the use of computer technology by integrating it into faculty meetings in the form of presentations by using the software that teachers are expected to use.
   A B C D E

21.) The administration includes me in the decisions for software purchases in my school.
   A B C D E

22.) My school provides opportunity for professional development in the use of computer technology.
   A B C D E

23.) My school provides opportunity for professional development in the integration of technology in my instruction.
   A B C D E

24.) The administration of my school encourages faculty to take leadership in suggesting changes.
   A B C D E

25.) The administration of my school is receptive to providing resources that promote and support the use of computer technology in instruction.
   A B C D E
Appendix B

Letter to Principals
Anonymous

Dear Anonymous:

I write to request your approval allowing me to conduct a portion of my dissertation study using the faculty of your school as a data collection source. I am a doctoral candidate in the School of Education from the College of William and Mary in Virginia. I am enrolled in the General Administration program. I have asked for and received permission to proceed with this study in the your School System from your superintendent.

My proposed research project, will attempt to determine the factors that contribute to the integration of computer technology in classroom instruction. A literature review indicates that your school aligns well with technology use.

The data collection will involve approximately 15 to 20 minutes of time during a faculty meeting where I will administer a questionnaire for completion. In addition, I would like to interview 20% of the faculty at a later date during unencumbered time. Each interview will not exceed 15 minutes. My goal is to complete the questionnaire phase of data collection by December 19, 2000. Interviews will be scheduled for one day in the month of January, 2001.

Thank you for your time and consideration concerning my request. If you have questions or are in need of additional information, you may contact me at the above address, or by phone at. or email at. I will be in touch with you or your office within the next week.

Sincerely,

Philip M. Pavlidis
Appendix C

Informed Consent Document.

Because the research questionnaire will be administered during a faculty meeting, I will read the following aloud to the faculty and ask the building principal to sign-off as verification.

You are part of a research project. This study will attempt to answer the question: What are the factors that inhibit and enhance the integration of computer technology in classroom instruction? The questionnaire you are asked to complete should not take longer than approximately 10 minutes. Those of you who volunteer or are selected to be interviewed should expect that to last no longer than 20 minutes. Participation in any aspect of this study is voluntary, therefore no compensation is available. If for any reason you feel threatened or uncomfortable, you may discontinue participation. All data gathered will be anonymous and confidential. No person other than me will see the data. The data may benefit teachers by determining how to avoid barriers in integrating computers in instruction. If you have a question about the research and/or your rights after completion of the data collection, you may contact me, Philip Pavlidis at. (End of informed consent statement).

This same document will be used for the interviews however each participant will sign individually that they have read and understood the informed consent.
Appendix D

Letter to Superintendent
Superintendent

Dear Sir:

I write to request your formal approval allowing me to conduct a dissertation study using the three schools as data collection locations. I am a doctoral candidate in the School of Education from The College of William and Mary in Virginia. I am enrolled in the General Administration program.

My proposed research project, which will serve to fulfill dissertation requirements, will attempt to determine the factors that contribute to the integration of computer technology in classroom instruction. A literature review indicates that your Public School System aligns with exemplary status in the use of technology.

In the near future, and with your permission, I will survey all faculty members of the middle schools, and interview a small percentage.

Thank you for your time and consideration concerning my request. If you have questions or are in need of additional information, you may contact me at the above address, or by phone at, or email at.

Sincerely,

Philip M. Pavlidis
Appendix E

Interview Questions

And Similar Responses

And Response Rates
1) Tell me about your personal use of computer technology.

"I use internet, word processing, AOL, lots of email. Access to excel for grades is what I use. I also use publisher from time to time, we do that as a team. newsletters and such". (40)

"I use it for correspondence with kids at college, proof reading and writing for letters. I also use search engines for information and resources". (1)

2) In a perfect world, what would your classroom look like if there were no barriers or concerns with regard to the use and integration of technology in instruction?

"Every kid would have a laptop to be used in various ways. It would help kids with motor skills. With the information easily accessible, it can all be done in the classroom all at one time, less break in instruction". (27)

"A small computer would be at every desk, in the desk with a keyboard and screen right there so it wouldn't get knocked over. The students would be able to access information as easily as opening their notebooks and I wouldn't have to worry about how long it would take". (6)

"I would have more computers, probably for each student to have their own. That would give me the time to use wisely, and the students would be able to get immediate information that we couldn't do otherwise. I find it challenging to work things out with only a four computers". (5)

"I could see laptops for each student but they should stay here in school. I would
like to use it for homework. We could have electronic homework where it zaps it home, the students wouldn’t have to worry about the assignment, kind of like the on-line classrooms that are advertised". (3)

3) What are the expectations placed on you by the administration with regard to the integration of computer technology in classroom instruction?

"Expectations are obtainable, reasonable, they want us to integrate technology on a regular basis, you know, word processing, internet, research, and presentations". (17)

"To use as we see fit, given the situation. It all depends on what I’m covering, but I know that you can’t expect all the material to be connected to computer use all the time. The expectations are fair, they are understanding of different situations". (14)

"I think the expectations are good. I wish they were higher but not unattainable. I think they are really hard to monitor. Some lessons don’t require the computer and some do. It’s slow in coming but we need more tech support". (6)

"The expectations are simple, that the computer will be used as much and as often as possible". (4)

4) Tell me about some of the barriers you have encountered in your development with regard to the use and integration of computers in instruction.

"Time in planning as well as time for the kids to get on the computers. The number of computers, programs available and time to get them and load them on". (15)

"Not enough immediate access. I only have five, it would be nice if I had 20 or 25 so we could just go to them and do things". It’s really hard to coordinate the computer
lab schedule with a lesson in advance”. (12)

“The system goes down, web sites previously researched no longer exist, or they have changed and that messes up my plans. Coordinating, trying to get kids on and accommodating the time some need and having it all go smoothly”. (8)

“The lack of keyboard skills by students. The computers working consistently and fitting it into time and time management. (6)

5) In your opinion, to what degree do you believe computer technology has been integrated in the instructional program?

“I think to a high degree, but we are still afraid of the system going down even though they have switched to a more reliable network. I’ve seen over the years we went from skill and drill to accessing information and using it”. (13)

“To a fairly high degree, although I don’t use it as much as I would like to. Colleagues are in the same position”. (10)

I’d say 75% of the staff uses computers for various reasons. Maybe not everyone does due to some of the barriers we talked about before”. (10)

“I think high, on a scale of one to ten, probably between seven and nine”. (8)

6) Tell me about the resources made available to support the use of computer technology in your instruction.

“Math programs, Logal is outstanding, accelerated reader, our sysops is great. I wish we had more programs and time to get through them, you know coordinate things. I wish we could clone our sysops too because we don’t have training on how to fix things when they go down, instead we have to call our sysops and she’s not always immediately available”. (16)
“Sysops, classes provided by the county, the lead teachers, they send material. I have more resources that I have time to make use of”. (14)

“We have a technology institute, a web master, and a sysops who is wonderful. We can always take classes and our sysops helps us with anything we need”. (11)

7) As a faculty, what are the expectations for students with regard to the use of computer technology in the classroom?

“I’d say pretty high, we expect them to be well versed and do everything from word processing to spreadsheets, to the internet”. (24)

“We have high expectations due to the SOL’s. We take a little for granted, we assume they have given skills, that may not be accurate, but we expect them to use the machines pretty effectively”. (12)

“We have high expectations, we taught spreadsheet and powerpoint, but now the kids coming in already know how to do it” (5)

8) What is your definition of computer integration in classroom instruction?

“Let’s see. I’d say using computers to enhance instruction to further student comprehension of a content area or skill”. (18)

“Whenver possible, incorporating computers and not being superficial, but actually relevant to instruction to complement instruction”. (14)

“It’s like using programs, drills and skills, teaching a concept, and reinforcing previous lessons”. (9)

9) Tell me about staff development in your school.

“It’s more than adequate, and very flexible, accessible, informative, challenging, and above average”. We have opportunity to do several things in technology and it’s
“I think it’s outstanding. We have different days where we can get the computer skills we need. They have on-going classes for us to take and we do”.

“We have had several days in the past set aside for computer technology. There were some problems, I think the intent is there but sometimes the network doesn’t cooperate. We haven’t been taken as far as I expected”.

10) Tell me about the goals set forth by the administration in this building and central office with regard to computer integration in instruction.

“It’s almost too broad. Excel, and spreadsheets, power point, there are others also. We are expected to have a wide knowledge and be computer literate and be able to give kids access. Some kids are more literate than I am”.

“Goals are SOL related. If we pass the competency situation, we’re ok. This is what shall be done and be a regular part of your day”.

11) What is the comfort level among the faculty in approaching the administration for support with regard to instruction and changes in practice?

“Off the scale, very comfortable, they are easy to approach. At least they are open to listen. I haven’t met anyone who feels afraid of mentioning something”.

“Fairly comfortable, at least in voicing them. There are some seasoned veterans who are not as interested or motivated to learn and incorporate new stuff.”

12) Describe the response this faculty would receive if they collectively approached the administration with a proposal for a change in how things are done?

“I think they would be very open to listen to suggestions, and make decisions and relate the decision and why. There is a lot of respect between the administration and
staff, we are all professionals, that’s for sure”. (28)

“If everyone banded together and said we think computers should be optional. I think the administration would say it’s trickle down and it’d county wide. and we must do it. I think they would have open ears, but they would do what was good for the school”. (13)
Vita

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References


