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Learning Style, Teaching Style, and Attitude Toward Change as Predictors for the Adoption of Computer Technology by Elementary School Teachers

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Learning Style, Teaching Style, and Attitude Toward Change as Predictors for the Adoption of Computer Technology by Elementary School Teachers

By

Bernadette Kelley

A dissertation submitted to the Doctoral Studies Faculty in partial fulfillment
of the requirements for the degree of
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To The Dean of Graduate Studies: Date: November 3, 1995

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has submitted, in partial fulfillment of the requirements for the degree of **DOCTOR OF EDUCATION** in the College of Education and Human Services, a dissertation entitled: "Learning Style, Teaching Style, and Attitude Toward Change as Predictors for the Adoption of Computer Technology by Elementary School Teachers"

This dissertation has been examined by all members of the candidates's supervisory committee and has been ✓ Approved _____ Rejected.

The committee has examined the candidate on 11/3/95 (date) in accordance with the regulations governing the Final Examination and has adjudged her/his performance ✓ Satisfactory ___ Unsatisfactory.

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DEDICATED TO

MY MOTHER, PEARL COHEN

MY FATHER, WILLIE COHEN

MY SIGNIFICANT OTHER, TOMMY

MY TWO SONS, CHRIS AND BRETT

FOR THEIR LOVE

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TABLE OF CONTENTS

LIST OF TABLES

ABSTRACT

Learning Style Teaching Style, and Attitude Toward Change as Predictors for the Adoption of Computer Technology by Elementary School Teachers

This study investigated the learning style, teaching style, and attitude toward change of elementary school teachers and the relationship of these variables to the adoption of computer technology into teaching and learning strategies. The researcher used four instruments to gather data about the preferred learning style, teaching style, attitude toward change, and current utilization of computer technology both personally and with students.

Survey forms were delivered to seven selected elementary schools in a Northeast Florida public school district. An educational technology survey was distributed to each of the 200 elementary school teachers in these schools. The return rate of completed surveys was approximately 36% (N=73). In addition, those teachers in each school who elected to participate in this study completed one of the following instruments: the Teaching Style Inventory, the Change Seeker Index, or the Learning Type Measure .

Statistical analyses were conducted to determine if there were any significant relationships among the three factors (teaching style, learning style, and attitude toward change) and the adoption of computer technology by the teachers in this study. Descriptive statistics were used

to describe the length of computer use and the location of computer use by the participants as well as other demographic variables.

The major findings of the study were:

(1) The highest instructional use of the computer by teachers was drill and practice.

(2) Teachers were using the computer sparingly. The usage of the computer with their students ranged from once-a-year usage to daily usage. The most frequently reported usage was drill and practice on a daily basis.

(3) No significant relationships between the preferred learning style and the adoption of computer technology were evident.

(4) No significant relationships between the teaching style of the participants in this study and the adoption of computer technology were identified.

(5) The relationship between the intrinsic factors and the adoption of computer technology was not significant. The relationship between the extrinsic factors and the adoption of computer technology was significant at the $p<.01$ level.

Recommendations related to preservice teacher education, inservice training, and promoting the adoption of technology were made. Also, recommendations were made regarding future investigations that examine the relationship of learning style, teaching style, attitude toward change, and the adoption of computer technology by school teachers.

CHAPTER ONE

Introduction

Looming on the horizon is the 21st century with the promise of increased use of technology by the entire society. During the past ten years the growth in the number and use of computers has been phenomenal (Becker, 1993; Henry, 1993; Plomp & Pelgrum, 1993). As the world has moved from an industrial to an information society, an increasing number of adults have been affected by computers in both their work and their personal lives.

Computer technology in the schools also has grown since the inception of the personal computer. In the United States, there is approximately one computer for every nine students (Office of Technology Assessment (OTA), 1995).

The integration of computer technology into education is a complex innovation and cannot be accomplished within a short period of time. As technology continues to permeate every aspect of organized society, both the novice and the veteran educator must contend with using computer technology to deliver instruction. Computer technology usage is one component of teacher preservice and inservice preparation which deserves and needs attention in an effort to aid educators to meet these technology demands of the 21st century.

Traditionally, teachers receive preservice education when they are 18 to 22 year old college students. Most of today's practicing teachers

did not encounter computer-based technologies in their K-12 education or in their teacher preparation programs. Many studies concerning computer technology and inservice teachers suggest that many of these teachers are fearful of computers and are uncomfortable with the thought of incorporating computer technology into their classrooms (OTA, 1995).

The current study examined learning style, teaching style, and attitude toward change related to the acquisition of knowledge and understanding. The purpose of the study was to investigate the relationship, if any, of these three factors to the adoption of computer technology by elementary school teachers. It was anticipated that the baseline data presented would assist teacher preparation and inservice programs to provide instruction that reduces computer anxiety and increases the teachers' confidence in their ability to use computer technology in their classrooms.

Definition of Terms

The following definitions apply to the terms used in the context of this study: Learning style/strategy - the preferred way or technique a person uses to organize and process information as measured by the Learning Type Measure (Excel, 1993).

Teaching style/strategy - the type of delivery or mode of instruction as measured by the Teaching Style Inventory (Dunn & Frazier, 1990).

Attitude toward change - an individual's tendency to seek out varied stimulation in this study as measured by the Change Seeker Index (Garlington & Shimota, 1964).

Adoption of technology - voluntary choice by an individual to use computer technology as a part of one's teaching strategy as measured by the level of use section of the Educational Technology Survey used in this study.

Intrinsic factors - internal motivations such as the personal desire to adopt computer technology as measured by the Educational Technology Survey.

Extrinsic factors - external motivations such as money, release time, training, recognition, and other external factors provided to motivate teachers to adopt computer technology as measured by the Educational Technology Survey.

Level of adoption - stage of use of computer technology as measured by the Educational Technology Survey.

Purpose of the Study

The purpose of this study was to examine factors that might influence elementary teachers to use computer technology as a teaching methodology. Specifically, the study examined the relationship between elementary teachers' (a) learning style, (b) teaching style, (c) attitude toward change, and (d) intrinsic and extrinsic factors (e) demographic factors and their adoption and use of computer technology.

Research Questions

This study addressed the following research questions:

(1) Is there a relationship between elementary teachers' learning style and their adoption of computer technology into their teaching and learning strategies?

(2) Is there a relationship between elementary teachers' teaching style and their adoption of computer technology into their teaching and learning strategies?

(3) Is there a relationship between elementary teachers' attitude toward change and their adoption of computer technology into their teaching and learning strategies?

(4) Is there a relationship between intrinsic and extrinsic factors as elementary teachers adopt computer technology into their teaching and learning strategies?

(5) Is there a relationship between elementary teachers' teaching experience, age, sex, and other demographic factors and their adoption of computer technology into their teaching and learning strategies?

Significance of the Study

Schools have spent a large amount of money on computer technology without much attention paid to factors that might affect the adoption of computer technology by teachers. Studies that have been done have focused mainly on organizational and contextual factors such as the amount of funds provided to the school, availability of hardware,

size of school, types of technology policies, etc. This study addressed factors that are primarily related to the individual as opposed to the school or the school setting. Because change is a one-by-one, highly personal thing (Hord, Rutherford, Huling Austin, & Hall, 1987) it is important to conduct an examination of how individual teachers react to change, how teachers learn, how they teach, and how they adopt new tools and teaching strategies. The underlying premise of this study is that it is the individual teacher that plays the central role in determining the adoption or rejection of computer technology in the classroom.

Sample

Two hundred teachers were invited to participate in this study. These two hundred teachers were on the faculties of seven elementary schools which were Academy for Excellence schools. The Academy for Excellence was a grant funded by the State of Florida Department of Education to improve school climate, instructional effectiveness, student achievement, and four other areas chosen by the participating schools. As faculty members in these seven schools, each teacher had attended inservice training in the use of computer technology in the classroom. Additionally, some of these teachers had completed university course work in the use of computers. Of the teachers invited, 73 teachers elected to participate.

Procedures

The procedures for this study included the use of four self-administered assessment tools, direct classroom observation and

structured interviews. Each of the 73 participants in the study was asked to complete the Educational Technology Survey (ETS) designed by the researcher to verify the computer technology usage of the participants, to collect motivational information, and to obtain relevant demographic information. Prior to this administration, the Educational Technology Survey (ETS) was reviewed by a panel of experts for content. A sample of twenty-five experienced teachers was used to establish content validity. A copy of the initial survey and the revised survey are provided in Appendices A and B.

It was discovered during the review process that the completion of all four instruments would require a large block of time. To possibly increase the return rate of the surveys, the decision was made to have participants complete the ETS and one other instrument. A copy of the ETS and either the Learning Type Measure (LTM), the Teaching Style Inventory (TSI), or the Change Seeker Index (CSI) was placed the participants school mailbox.

The Learning Type Measure (LTM) was based upon the 4MAT System which was developed by McCarthy (1980) and was administered to the participants to determine their preferred learning style. The Teaching Style Inventory (TSI) was developed by Dunn and Dunn (Dunn & Frazier,1990) and was administered to a sample of participants as a measure of their teaching style (See Appendix C). The Change Seeker Index (CSI) was developed by Garlington and Shimota (1964) and was

administered to a sample of participants to obtain a measure of their attitude toward change (See Appendix D).

Two measures were used to determine teachers' adoption of computer technology. First, all participants completed the "Level of Use" sections of the ETS (See Appendix B) developed by the researcher. This provided a self-reported measure of the nature of adoption of computer technology by the teacher. The ETS consisted of seven sections. Section A was the personal information section. Section B was used to gather information about location of computers used by the teachers in this study. Sections C and D were used to collect data about the frequency of use and the type of use by the participants in this study. Section E was used to describe the type of grouping the teachers in this study employed with their students when using computers. Section F collected data on the computer components used at home and school by these teachers. The final section asked questions that described the motivational factors that led to the adoption of computer technology by the teachers in this study.

The second measure of the adoption of computer technology was the Level of Adoption Index. This index was computed by the researcher using sections C and D of the Educational Technology Survey.

In addition, a convenience sample of participants was interviewed to further verify the self-reported data. The results of these interviews will be used in future studies. The interview questions are provided in Appendix E.

Data Analysis

Data from this study were analyzed by examining the degree of computer adoption by participating elementary school teachers and comparing it to the elementary teachers' scores on the learning style, teaching style, and attitude toward change instruments using statistical analyses. In addition, correlations were conducted to determine the influence of the demographic variables. Data obtained from the observation and interview of selected teachers were examined to interpret the information collected via the self-administered assessment tools.

The dependent variables include the adoption of the following computer technology instructional and learning strategies: (a) software tools, (b) problems to solve, (c) presentation software, (d) cooperative learning groups, (e) learning stations, (f) student problems, (g) drill and practice, (h) telecommunications, and (i) an overall determination of level of adoption. Independent variables include measures of teachers' learning style, teaching style, attitude toward change, motivation for adoption of computer technology, years of teaching experience, and gender.

Delimitations and Limitations

Interpretation of the study is limited to the selected participating sample of elementary school teachers in Northeast Florida and other equivalent populations. These schools were selected because they were

involved in a program that offered the teachers employed at each school an opportunity to learn to use computer technology in their teaching methodology. In addition, the study was limited by the inherent weaknesses of self-assessment tools, and limitations associated with structured interviews. Finally, the size of the sample constitutes a limitation that may affect the generalization of the results of this study.

Organization of the Study

This study's organization is as follows: Chapter One presents the background data for this study by providing the definition of terms used in this study, the purpose of the study, research questions, significance of the study, population description, procedures used, data analysis, and delimitations and limitations. Chapter Two reviews the related literature. This chapter investigates the literature in areas addressed by the study: adoption of computers in education, teaching and learning styles, and attitudes toward change.

Chapter Three presents the research design, methodology, research questions, procedures for data collection, and details about the population sample. The measurement tools employed in this study and their reliability and validity are discussed. A detailed description of the data analysis procedures and considerations is also provided.

In Chapter Four an analysis of data and summary of findings are presented. Chapter Five includes the summary and conclusions for this study. In addition, recommendations for further study are discussed. Finally, the appendices and cited references are presented.

CHAPTER TWO

Review of Literature

Introduction

The purpose of this study was to examine the adoption and incorporation of computer technology by experienced elementary school teachers (adults) into teaching and learning strategies. The review of the literature focused on the following areas: attitude toward change, intrinsic and extrinsic motivating factors, learning style, teaching style, and computer utilization in schools. A number of the studies conducted between 1990 and 1995 revealed the ways in which technology is being used in schools (Becker, 1993; Cuban, 1993; Plomp & Pelgrum, 1993; Sheingold & Hadley, 1990). However, only a limited number of studies were discovered that addressed the relationship of learning styles, teaching styles, attitude toward change, and the adoption of computer technology by experienced teachers in their teaching and learning strategies.

Attitude toward Change

The availability of technology, the desire of students to use computers, and the emphasis placed on technology by local and state governments has made preparing teachers to take full advantage of instructional technology one of the biggest concerns of those responsible for inservice and preservice education programs (OTA, 1995). Changing the mindset of educators toward computers is a task that must be undertaken by teacher education programs to ensure the technology

goals for schools are met. Changing this mindset requires providing a vehicle by which current and future educators can obtain the necessary technology skills to improve the instructional process of students via computer technology and emerging technology in the 21st century. This is essential to all teacher education programs (OTA, 1995). Citing researchers who have sought to influence and change teacher attitudes toward computer-using interventions, Savenye (1993) suggests that participation in a semester long computer application course positively influenced and changed preservice teachers' attitudes toward computer technology usage in teaching.

Polin (1992) in her five year longitudinal research focused on a taxonomy for teacher change in the use of technology. Polin proposed that there are three kinds of real change: technical, illusory, and constructive. Technical change is procedural change without a clear understanding of the process. Teachers at this level of change accept the innovation only when things are going according to plan. The teachers at this stage of change quickly abandon the innovation. Teachers at this stage of change haven't developed the generative resources for carrying out alternative plans if change doesn't proceed as planned or outlined. Illusory change is more common in computer projects according to Polin. Illusory change represents the teacher's lack of conviction. Teachers at this stage of change are not convinced that computers are useful: "We'll do it, but we don't think it's going to matter." Constructive change is identified as a clear understanding of the intention

as well as the procedures of an innovation. It is informed practice. Teachers at this stage of change have adapted the project or innovation to suit local conditions while remaining true to the original purpose of the change. Technical change represents the teachers lack of understanding, illusory change represents the teacher's lack of confidence, and constructive change, according to Polin, represents the ideal kind of change. Polin further suggested that teachers move along a continuum as they adopt the change of using computer technology in their teaching and learning styles.

The research of Hord (1987) described a model for change that addressed an effective way to adopt an innovation which was based upon the work of Hord and Loucks (1980). Hord and Loucks' (1980) model, the Concerns Based Adoption Model (CBAM), outlined a developmental process that individuals experience as they implement an innovation. The model was based upon seven assumptions about change: change is a process, not an event; change is made by individuals first; change is a highly personal experience; change entails multilevel developmental growth; change is best understood in operational terms; change facilitation must suit individual needs; and change efforts should focus on individuals, not innovations. Based upon these assumptions Hord (1987) developed a set of conceptual tools for planning, facilitating, monitoring, and evaluating change. She defined three tools to examine change: stages of concern; levels of use; and innovation configurations. The first tool of change, stages of concern, is a set of categories denoting an

individual's theoretical or actual progression with respect to an innovation. The categories include awareness, informational, personal, management, consequence, collaboration, and refocusing. Hord's second tool of change was levels of use. Levels of use focuses on people's behaviors and skills with respect to an innovation. The emphasis for this tool is placed on how the individual is using the innovation. Level of use categories included two broad areas, nonuser and user. The nonuser included three levels; no use (no action), orientation (information seeking), and preparation (the individual is preparing to use the innovation). The user area included mechanical use (organizing for better use), routine (established pattern of use), integration (deliberate efforts to use the innovation), and renewal (seeks alternative use of the innovation). The third tool was innovation configurations. This tool is used to examine the innovation as it is being used in the current setting, and comparing the current use to the original intent. The steps for identifying innovation configurations included questioning the developer and/or facilitator for innovation components, interviewing a small number of users, observing a small number of users, constructing a checklist, and completing a checklist for each user. Each of these tools provided insight into discovering and facilitating change and the adoption of technology into teaching and learning. In addition, this model provided a framework for assessing the adoption and infusion of computer technology into the teaching strategies of the experienced teachers (adults) in the current study. "Change is a highly personal experience - each and every one of

the teachers who will be affected by change must have the opportunity to work through this experience in a way in which the rewards at least equal the cost" (Fullan & Stiegelbauer, 1991, p. 127).

Given the resources, the necessary training, the technical support, and the mindset to change, there are still factors that need to be addressed for full infusion of technology into teaching and learning by teachers. Motivation and commitment to the adoption of an innovation are the factors that complete the equation and lead to successful integration of technology into teaching and learning strategies. Sheingold and Hadley (1990) in their nationwide survey of teachers who were experienced and accomplished at integrating computers into their teaching identified several factors that contributed to their success. The teachers' motivation and commitment to their students' learning and to their own development as teachers was the first factor. The second factor was the support and collegiality the teachers experience in their schools and districts. Access to sufficient quantities of technology was the other major factor these researchers identified. Each of these factors combined with sufficient time to develop skill in technology usage lead to the teachers' expertise and willingness to use the technology in new ways, and to use what they learn from their students in the classroom.

Attitudes toward change and the motivation to accept change are important factors that must be addressed before meaningful utilization of computer technology by school teachers takes place. The teachers'

willingness to learn and change is the critical element in the process of computer adoption.

Learning Style

The literature is rich with discussions about different learning styles and preferred instructional methodologies of the older student. Polson (1993) indicated that instructors should use a variety of teaching techniques such as active participation by students, task oriented assignments, role play situations, large and small group discussions, and posing questions that encourage students to integrate new learning with experiences. Yet, the lecture method of instruction is used almost exclusively in higher education and adult education programs (Curry, 1990).

There is no apparent agreement in the literature as to what constitutes an adult learner, or whether or not adult learners learn differently than the traditional student (Polson, 1993). However, Polson has suggested that adult learners possess characteristics that distinguish them from the traditional 18 to 22 year old student. She identified these attributes as adults usually have multiple roles, more life experiences, varied developmental tasks, clearer educational goals, and off campus directed. Adult students' educational experiences usually have not been recent. Knowles (1980) suggested that adult learners (teachers) are characterized by the ability to be self directed, have past experiences that

serve as resources for future learning within a problem solving framework, and are ready to be actively involved in increasing their level of

competence. Knowles suggested five focal points that he felt should be considered by those who teach adults: self concept, experience, readiness, time perspective, and orientation to learning.
Other authors (Ross, 1990; Strange, 1989; & Sweeney, 1988) have supported Knowles' theory of teaching adult students in a student centered environment which promotes the idea of lifelong learning.

Ely (1993) suggested that for meaningful and lasting learning to occur, greater emphasis should be given to specific techniques which encourage and nurture a clear understanding by adults. Most adults appear to learn through a combination of directed instruction and self directed learning. It is widely attested that adult learners alternate periods of self directed study with engagement in formal courses. Thus, any effort to assist adults in periods of self directed inquiry are likely to pay dividends at a later date (Brookfield, 1985).

The differences between adults and preadults as learners lies in the nature of life experience. Adults know more than youth because of a more complex cognitive structure that comes with aging (Ross, 1990). Adults, however, usually do not limit themselves exclusively to learning through self directed means.

Emerging theories of intelligence offer additional insights about the place of individual learning strengths, the role of experience in learning,

and the importance of defining intelligent behavior among adults. Gardner's (Gardner & Hatch, 1990) theory of multiple intelligences proposed that there are a number of different types of intelligence. Gardner has identified seven possible types of intelligence. Two of them, linguistic intelligence and logical mathematical intelligence, deal with the kinds of abilities in verbal communication and logical reasoning that traditionally have been measured by educators. The remaining five are musical intelligence, spatial intelligence, bodily kinesthetic intelligence, and two interdependent forms of personal intelligence intrapersonal and interpersonal. Gardner's theories have suggested that thinking in terms of multiple intelligences will help in planning educational programs and the selection of teaching methods for instruction of adults (Gardner & Hatch, 1990).

There is an excellent case for a link between the characteristics of adult learners and the characteristics of the microcomputer. As stated previously, Knowles (1980) proposed some basic assumptions about how adults learn. A normal aspect of adult maturation is for adults to move from dependency to increasing self directness. Throughout their lives, they accumulate an increasing pool of experience from which to draw upon. Learning readiness is linked to the need to cope more with real life tasks or problems. Finally, adults' learning changes from future-oriented problem solving to now-oriented problem solving . Many researchers have proposed that the microcomputer fits with these assumptions (Becker, 1993; Carter & Honeywell, 1991; Conti & Fellenz, 1991; Henry,

1993; OTA, 1988; OTA, 1995). The microcomputer offers learning which is flexible in both place and time and is highly self directive. The microcomputer can provide variation of learning styles which can take into account the learner's experience and can be problem centered and immediately applicable.

It is unlikely that there is one best way to provide instruction. In broad terms, ideal instructional delivery systems are active, if not proactive, in responding to a wide range of learner needs. These instructional systems reflect the fact that most learners have multidimensional needs for information, support, and skill development. Technology is seen as a central aspect of the educational delivery system with computers playing a major role in facilitating information retrieval, simulations, and skill development (Sweeney, 1988).

Learning style is a concept which is concerned with individual differences in information processing. The theoretical framework for learning styles rests in the functionalist and psychoanalytic schools of psychology. In the 1960's, instructional improvement projects began to explore individual differences as the factor that determined the effectiveness of various instructional methods (Debello, 1989). The improvement of instruction spearheaded the movement to shift from the cognitive style base to the more practically based learning styles. Learning style is often regarded as being a subset of cognitive style. DeBello (1989) defined learning style as the way people absorb or retain information. Claxton and Murrell (1987) and Hays and Allison (1992)

suggested that the relationship among instructional strategy, cognitive style, and learning performance offers the promise of improving educational outcomes if instruction is designed to accommodate the learning needs of subjects.

Bonham (1988) identified some of the major theorists and developers in the learning style arena. These included David Kolb (Learning Style Inventory), K. A. Gregorc (Gregorc Style Delineator), and B. McCarthy and M. Lieberman (4Mat System). Kolb, Gregorc, and others (cited in Bonham, 1988) have pointed out that adults learn in a variety of ways. Kolb (1976) posited that different learning environments require different skills of learners, and learning is more efficient when learners are presented information in a manner that matches their cognitive or learning styles. McCarthy's model for learning styles was based-on Kolb's construct that all people sense and feel, observe and think, experiment and act. She proposed that all learners move continually between abstract conceptualization and concrete experience while learning (McCarthy, 1980). McCarthy also proposed that learning style issues lead directly to instructional issues, which lead directly to curriculum issues.

Learning style identification may have implications for those planning inservice and preservice instructional programs that encourage the use of computer technology in teaching and learning strategies. The review of the literature suggested that learning style is an integral part of learning and should be considered as a design variable when planning for

the full integration of computer technology into teaching and learning strategies.

Teaching Style

Literature related to teacher preparation indicated that many feel that education majors believe themselves to be much less prepared to teach with computers than they are to deal with any other aspect of their teaching (Hunt & Bohlin, 1993). In order to train teachers (both prospective teachers and inservice) to use computer applications, some colleges and school systems have provided a separate computer education course, and others have incorporated computer based methods in subject matter courses. However, as evidenced by the literature review thus far, little or no formal evaluation exists to support the various teacher computer education practices (Becker, 1991).

During the early 1970s, many studies were conducted to discover what teachers do in the classroom to promote achievement of their students (Alkin, 1992; Hilliard, 1992). The behaviors examined included warmth, flexibility, academic preparation in a subject, teaching experience, thinking and decision making. Findings from these types of studies indicated that it is difficult to relate general characteristics of teachers to student performance.

The work of teachers was also perceived and accomplished differently by teachers at various career stages. Stage development was the focus of many researchers as it relates to teaching. Glickman, Gordon, and Ross-Gordon, (1995) summarized key studies and findings

in stage development: cognitive development, conceptual development, moral development, and ego development. These authors proposed that teachers function at different stages and different stages of concern, and they (teachers) should not be treated as a homogeneous group.

Similar to conceptions of human development, the stage development theories suggest that teaching is a career continuum. As teachers move from one stage of teaching to another, their teaching styles change in response to their students, curriculum, and their stage of development.

Teachers are a critical link to the utilization or lack of utilization of technologies in the classroom. The adaptation of materials to teachers' personal teaching styles is a significant component in the incorporation of more and more complex technologies into the curriculum.

Adoption of Computer Technology

In a study conducted by the International Association for the Evaluation of Educational Achievement (Plomp & Pelgrum, 1993), results indicated that the United States leads in the availability of computers in public schools (one computer for every 10 to 15 students). Computers have been identified as the great equalizers in U. S. schools according to this group's study. The study has shown that when students have access to computers, the gap between the economically poor students and their more affluent classmates declines significantly.

As elementary teachers prepare to respond to the needs of their students, the evolution of technology has resulted in transformations in

every aspect of society. For the past two decades many changes in computers and in the software programs available for elementary teachers have occurred. The content of computers in education, as indicated by curriculum models, textbooks, and actual practice, has not completely stabilized (Cuban, 1993). However, studies such as the one completed by Robyler (Florida A & M, 1994) have demonstrated that few teacher education programs require preservice teachers to engage in a separate course that would provide grounding in technical and integration skills common to any application of technology.

The International Association for the Evaluation Achievement (IEA) was founded in 1959 for the purpose of conducting international comparative studies of achievement of school students in order to enhance learning within and across systems of education. IEA decided in 1985 to start the "Computers in Education" (Comped) study as a two stage study with data collection in 1989 and 1992. Both stages of the study discussed measures of student outcomes as related to computer usage within the schools (Plomp & Pelgrum, 1993). In the IEA Comped study, information was collected regarding the goals and uses of computers in education.

Data from the attitude parts of the questionnaires demonstrated that educational practitioners have high expectations about computers. Plomp and Pelgrum (1993) showed that educational practitioners in most countries have very positive attitudes about the educational impact of computers. The data showed that improved educational outcomes were

not only an expectation, but teachers in the USA indicated that they observed an increased availability of feedback about student achievement, an increased interest by students, and increases in student achievement.

If teachers are to improve learning of students through technology, they must also become students of technology. The presence of a computer or any technology is not a guarantee that it will be used effectively. Miller (1992) pointed out when describing the increased use of multimedia in today's schools, multimedia is not going to succeed in education unless teachers adopt it as their own. Many educators lack the technological expertise necessary to incorporate the latest innovations into their teaching strategies. "Unclear and unspecified changes can cause great anxiety and frustration to those sincerely trying to implement them" (Fullan & Stielgelbauer, 1991, pp.70-71). If teachers are to fully integrate the latest technology tools into their teaching strategies, teachers need well equipped facilities, ongoing training, ongoing technical support, and a change in attitude towards technology (Hasselbring, 1991; Henry, 1993; Plomp & Pelgrum , 1993).

Summary

Full implementation of computers into the teaching strategies of teachers is a goal that must be reached as the development of technology and the demand for technology continues to increase. If schools are to prepare students for the real world, then time for teachers to acquire skill

in the use, integration, and assessment of new technologies must be provided. Teachers must also be aware of their own strengths and weaknesses as they develop along the career continuum. In addition, teachers must be willing to respond to their students by adjusting teaching methods according to the curriculum and the needs of their students.

CHAPTER THREE

Design and Procedures

Introduction

This chapter reviews the procedures used in this study, identifies the specific research questions examined, and presents the instruments and data collection procedures used.

Research Design

This study employed an ex-post facto, correlation design. The primary purpose of the study was to determine the relationships between elementary teachers' learning styles, teaching styles, attitudes toward change, intrinsic and extrinsic factors, and various demographic factors and the teachers' adoption of computer technology. Specifically, the study focused on the question of whether the learning strategies and/or teaching strategies are meaningful predictors of adoption computer technology into teaching.

Research Procedures

The procedures incorporated in this study included the use of self-administered surveys, teaching and learning style inventories, classroom observations and structured interviews. Data were collected from the participants over a six week period during the spring of the 1994-95 school year.

Each participant was asked to complete an educational technology survey, developed by the researcher (Appendix B) and one of the other

three teaching, learning or attitude toward change instruments. After the initial self-reporting data were collected, a convenience sample of the participants was selected for classroom observations to identify the level of computer usage. The classroom observations were conducted using an Innovation Adoption Matrix (Hord et al., 1987). The Innovation Adoption Matrix measures the following components: (1) the use of drill and practice software, (2) assignment of tutorial software, (3) instructional games, (4) telecommunications, (5) problem solving/simulation software, (6) utility programs (7) general applications programs (i.e., word processing, spreadsheets), and (8) presentation software and hardware.

Finally, a convenience sample of participants was interviewed to further cross check the self-reported data. The analysis of the observations and interviews is not part of this report. Information was collected in such a way that anonymity of the individuals was protected. All instruments were precoded so that the researcher could make comparisons between the individual and group responses on the data collection instruments.

Research Questions

This study addressed the following research questions:

(1) Is there a relationship between elementary teachers' learning style and their adoption of computer technology into their teaching and learning strategies?

(2) Is there a relationship between elementary teachers' teaching style and their adoption of computer technology into their teaching and learning strategies?

(3) Is there a relationship between elementary teachers' attitude toward change and their adoption of computer technology into their teaching and learning strategies?

(4) Is there a relationship between intrinsic and extrinsic factors as elementary teachers' adopt computer technology into their teaching and learning strategies?

(5) Is there a relationship between elementary teachers' teaching experience, age, sex, and other demographic factors and their adoption of computer technology into their teaching and learning strategies?

Sample

The sample for this study consisted of 73 public school elementary teachers in Northeast Florida. This sample was selected from seven urban elementary schools which were part of the Academy for Excellence Program. Teachers on each of the schools faculties were invited to participate in this study. A copy of the Educational Technology Survey was placed in each faculty member's school mailbox. In addition, one-third of the teachers at each school also was given a copy of the Change Seeker Index, one-third received the Teaching Style Inventory, and one-third of the faculty members received a copy of the Learning Type Measure. The return of the completed surveys indicated the

teacher's election to be a part of this study. This procedure provided the researcher with a study sample of 73 elementary teachers employed in grades kindergarten through fifth grade during the 1994-95 academic year. The selection of the sample population was based upon the following criteria:

(1) Teachers had to have completed at least one college class or equivalent inservice program in the use of microcomputers in the classroom.

(2) Teachers had to have had at least one full year of teaching experience.

(3) Teachers had to have been employed full-time in an urban elementary school.

Procedures

The procedures for this study included a survey, and three self-administered assessment tools. Each participant completed an Educational Technology Survey (ETS) designed by the researcher to measure the use of microcomputers by the participants, and to obtain relevant demographic information. The ETS consisted of seven sections. Two of the sections (C and D) were used to determine the level of use of computer technology. Each participant's ETS was additionally analyzed using the Level of Adoption Index (LAI) developed by the researcher. The LAI consists of several questions from the ETS computed to determine how often the participants of this study used computer applications at home or at school, and which programs and applications these teachers

used with their students. These data were used to indicate the level of adoption of computer technology. Each participant was also administered one of three assessment tools. The Learning Type Measure (LTM) (Excel, Inc., 1993) was administered to a sample of participants in order to obtain a measure of their learning style. The Teaching Style Inventory (TSI) (Dunn & Frazier, 1990) was administered to a sample of the participants to measure their teaching styles. The Change Seeker Index (CSI) (Garlington & Shimota, 1964) was administered to a sample of the participants to measure their attitude towards change.

Research Instruments

The three assessment inventories chosen for this study measured learning style, teaching style, and attitude toward change. The LTM (Excel, Inc., 1993) was based upon McCarthy's 4MAT System which, in turn, was built upon the principles of Kolb's Learning Style Instrument. McCarthy's model proposes four learning style clusters. These clusters include type one learners who perceive with feeling and process by watching, type two learners who perceive with thinking and process by watching, type three learners who perceive with thinking and process by doing, and type four learners who perceive by feeling and process by doing. The LTM was designed to identify that area of attention given the highest priority and the relationship of this priority to the other three major aspects of knowing (Excel, Inc., 1993). The hemisphericity dimension of the LTM illustrates a personal preference for left- or right- mode approaches to learning. The left mode prefers the objective, rational,

systematic, and literal. The right mode prefers the subjective, intuitive, synergistic and figural. The LTM also measures how people process new learning. Watching and Doing are the two strategies that people use to digest new learning, but each person has a predisposition for one or the other. The combination of these three dimensions of learning type is the basis of the LTM.

For this study, only Learner Type Measure was used to describe the teachers' preferred learning styles. According to the LTM Presenter's Manual (Excel, Inc., 1993), the stems in the 15 items of Part A represent descriptions of the four types of learners. The learner types were found in several books and articles by McCarthy and her colleagues. McCarthy used this literature to establish and measure content validity. Construct validity was also reported. Three measures were used to establish construct validity: frequency of reported types, peakedness, and "correct" respondents rating a particular stem strongly. Reliability was described in two forms. The first was internal consistency, measured by the Cronbach alpha statistic, an the second was test-retest. However, the manual fails to report the values associated with these tests of reliability. Concurrent validity was also reported. The LTM was compared to the Learning Style Inventory and the Myers-Briggs Type Indicator. There was a 61.1% agreement between LTM and LSI. The chi-square test, Cramer's V and the Contingency Coefficient all showed a significant relationship between the LSI and the LTM.

The LTM is divided into two sections. The first section of the LTM consists of 15 questions. The questions in this section were designed to indicate preferences in attending to and acting on what is learned. Responses are in a forced choice format. Questions like "I learn best by: experimenting and tinkering, listening and sharing, hunching and exploring, or reflecting and thinking", and "I strive for: consensus, precision, efficiency, or adventure" are examples of the nature and type of questions and descriptors in this section. Section two of the LTM describes the respondent's preferences for doing versus watching when learning new concepts. Questions such as "When learning, I prefer: a quiet environment, or an active environment, " and "I prefer learning tasks that are: individual, or group" are the type of descriptors used to indicate the preference of doing versus watching. The two sections are scored and graphed. The intersection of the graphed scores provides a pictorial representation of the respondents learning type and preference for doing or watching when new learning is encountered.

The TSI designed by Dunn and Dunn in 1977 (Dunn & Frazier, 1990) identifies a teacher's style of instruction at the time of administration. The authors identified if these scores represent traditional modes or individualized modes of instruction. The TSI is comprised of eight major elements of teaching style. The eight major elements are instructional planning, teaching methods, student grouping, room design, teaching environment, evaluation techniques, teaching characteristics

and classroom management, and educational philosophy. Scores are reported for each of these areas.

Under instructional planning, elements of diagnosis and prescription for each student or group of students are presented. Responses are in a forced choice format utilizing a Likert scale. Respondents are asked to indicate how often they used planning techniques like whole class lessons, contracts, small group assignments, and creative activities with student options. Responses range from 1 for never to 5 for always. The range for scoring this section goes from 42, the lowest score, which indicates a traditional mode of planning, to a score of 210, the highest score, which indicates an individualized mode of planning.

The teaching methods section describes the instructor's behavior in classroom. This section identifies the way a teacher utilizes various methodologies. These methodologies include lecture, inquiry, small group, and individualized instruction. Responses are in the form of a Likert scale. The scale's range is from 1 for never to 5 for always. The traditional to individualized rating for this section ranges from a low score of 16 to a high score of 80, respectively.

Under the teaching environment section, the authors divided this section into three sub-areas. These sub-areas include student groupings, room design, and teaching environment. In the student grouping section, respondents are asked to indicate how often they use small groups, pairs, independent study, one-to-one with the teacher, any combination of the previous groupings, and a large group format. Responses in this section

use a Likert scale which ranges from 1 for never to 5 for always. The total score for this section ranges from 18 indicating a traditional mode of grouping students to 90 indicating a more individualized approach to grouping students.

The second sub-area is room design. In this section, the teacher indicates the way they divide, decorate, and design learning areas. The teacher indicates how often they use rows of desks, small groups, learning stations or interest centers, alcoves or dens, a variety of designs, and any combinations of the previously mentioned designs. The same Likert scale employed for the previous sections is used. The total score for this area ranges from 22 to 110. The lowest score indicates a traditional approach to room design. The high score of 110 indicates an individualized approach to room design.

The final sub-area for this section is teaching environment. In this section, the teacher indicates how often they provide for varied time schedules for individuals, learning activities and resources, and provisions for student mobility and nutritional intake. The responses for this section employ the same Likert scale as previous sections. The total score range includes a low score of 30 for a traditional approach to a high score of 150 indicating an individualized approach to teaching environment.

The fourth major area of the TSI was the evaluation techniques section. In this section, the teacher is asked to indicate how often they use each of the common evaluation paradigms. The choices for this

section include observation, teacher made tests, self-assessment tests, performance tests, criterion-referenced tests based on student self-selected individual objectives, criterion-referenced tests based on group objectives, standardized achievement tests, and achievement tests based on individual student potential. The lowest possible score for this section is 28 indicating a traditional approach to student evaluation by the teacher. A total high score of 140 indicates a proclivity towards individualized evaluation of the student by the teacher.

The fifth section of the TSI describes the teaching characteristics and classroom management utilized by the teacher. In this section the teacher describes the values and standards used to transmit learning to students. Classroom management is described by questions that indicate the provisions and procedures used to establish and maintain an environment in which instruction and learning occur. Questions in this section ask the respondents to describe themselves by selecting responses to such questions as "I tend to be concerned with how students learn." Other questions like " I tend to be authoritative to reach group objectives" indicate the classroom management style. The responses in this section use a Likert scale that includes 1 for not at all, 2 for not very, 3 for somewhat, 4 for very, and 5 for extremely. The total score in this section ranges from 20 to 100. The lowest score represents the traditional and the highest score represented the individualized approach to teaching characteristics.

The final section of the TSI is the educational philosophy section. This section describes the beliefs about education. These beliefs include the teacher's attitudes toward programs like open education, student-centered curriculum, alternative education, and traditional education. The responses to this section again use a Likert scale. The scale's range is from 1 for strongly disagree to 5 for strongly support. The total score for this section ranges from 44 to 220. The low score of 44 indicates a traditional educational philosophy. The high score of 220 indicates an individualized view of education.

The CSI was designed by Garlington and Shimota (1964). This 95-item questionnaire was designed to measure the need for variation in one's stimulus input in order to obtain optimal functioning. Change seeking, according to these researchers, is a habitual, consistent pattern of behavior which acts to control the amount and kind of stimulus input a given organism receives. "Stimulus input" includes stimuli from both internal (cognitive) and external sources. The CSI is based upon the theories of Berlyne, Dember, Fiske and Maddi (Garlington & Shimota, 1964). The reliability and validity of this instrument have been documented in several studies reported by Garlington & Russell (1983). The authors report that scores on the CSI have been correlated with other measures of the need for varied stimulation, the Sensation Seeking Scale, and the Stimulus-Variation Seeking Scale. Intercorrelation scores clustered in the .60's (Garlington & Russell, 1983).

The CSI consists of 95 questions. Each question is answered either true or false. A select number of questions if answered false indicate a need for high change seeking. Thirty-three of the 95 questions are part of this selection. High change seeking questions like "I like to complete a single job or task at a time before taking on others" and "I always follow the rule: business before pleasure" are the types of questions that are answered false by the respondents with a high need for change.

Educational Technology Survey Development

All participants completed the "Computer Use" section of the Educational Technology Survey (Appendix B) developed by the researcher. This survey provided a self-report measure of the nature of adoption of computer technology by the teacher. Teachers reported the type and amount of personal computer technology use and type and amount of use in the classroom. In addition, these teachers answered questions to determine intrinsic and extrinsic factors. The ETS was also used to collect demographic data relevant to this study. A code was assigned to each questionnaire to provide anonymity to those who completed this survey. The ETS was divided into eight sections. On the first section participants were asked to provide demographic information about themselves including experience in teaching and computer use. The second section asked participants to indicate the location of the computer they used personally. The third section of the ETS asked questions about how often specific computer applications were personally used by the teachers in this study. The next section of the survey asked

participants to indicate which computer programs they used with their students. Section five asked the teachers in this study to indicate how they grouped students when using computers for instruction. The sixth section addressed the type of computer components used by the study's participants at home or at school. Section seven asked participants to indicate the motivational factors that led to the adoption of computer use in their teaching strategies. The next section asked participants to indicate their overall satisfaction with using computers and their students' satisfaction with using the computer. Finally, a section was provided to allow participants to make any additional comments they felt were necessary.

Prior to its use in this study, the survey was reviewed for content validity using a panel of experts. It was pilot tested using a sample of twenty-five experienced teachers enrolled in computer classes at the University of North Florida to facilitate the ease of administration . A copy of the initial survey, and the revised survey are provided in Appendices A and B.

Data Analysis

Data from this study were analyzed by examining the degree of computer adoption by participating elementary school teachers and comparing it to the elementary teachers' scores on the LTM using a one-way analysis of variance. Correlations were run using the teachers' Level of Adoption scores and their scores on the TSI and CSI. The dependent variable in this study was the adoption of computer

technology. The independent variables include measures of teachers' learning style, teaching style, and attitude toward change, years of teaching experience, and gender.

In addition, correlations were conducted between the Level of Adoption Index and the intrinsic and extrinsic motivational factors which were identified by several questions on the Educational Technology Survey. Correlations were run to determine the relationship of each of the demographic variables and computer use.

The data from each instrument are also presented to show the characteristics of the teachers involved in this study. The data show the teachers' level of computer use. The data also provide a picture of their teaching styles, their learning styles, and attitudes toward change.

CHAPTER FOUR

Data Analyses: Procedures and Results

Introduction

The purpose of this study was to examine the adoption and incorporation of computer technology by experienced elementary school teachers (adults) into teaching and learning strategies. The underlying premise of this study was that it is the individual teacher that plays the central role in determining the adoption or rejection of computer technology in the classroom.

This chapter is divided into four main sections. The first section of this chapter is devoted to a description of the procedures followed in the data analysis. The second section is a descriptive summary of the demographic information about the teachers who were included in the sample as collected via the Educational Technology Survey (ETS). The third section provides an analysis of the ETS in regard to the nature and degree of adoption of computer technology by the participants. In the fourth section of this chapter the results related to the five primary research questions established as the basis for the study are reported. The final section provides a summary of the overall data analysis.

Data Analysis Procedures

Three procedures were used to analyze the data for this study. The first procedure used descriptive statistics for the analysis of demographic data related to the study population. The second was an analysis of variance using the teachers' scores on the LTM and their reported

computer use from the ETS. The third and final procedure used was correlational analyses using Teaching Style Inventory score, Change Seeker Index scores, and demographic characteristics of these teachers and the Educational Technology Survey's Level of Adoption Index.

In order to perform correlational analyses between the level of adoption of computer technology by the participants and their respective teaching styles, and attitude toward change, the researcher developed a Level of Adoption Index (LAI). This index was developed to provide an overall measure of the level of adoption of technology by the participants. The index was created by computing the sum of those items on the ETS that described the frequency and type of computer technology employed by the teachers in this study both personally and with their students (i.e., survey items in sections C and D). The Level of Adoption Index score was then correlated with the respective scores on the TSI and CSI.

Population Demography

The participants for this study were 73 elementary teachers currently employed in selected schools in Northeast Florida. Table 1 provides a description of the sample by sex, age, years teaching and years experience at the school where the study was conducted. As the data indicate, the study population were very typical of elementary school teachers in general. Of the 73 subjects that participated in this study, three (4.1%) were male and 60 (82.2%) were female. The ages of the study's participants ranged from 23 to 65 years. The average age of

participants was 30 years, 6 months. The number of years teaching

Table 1

Demographics of Study Participants

Variable		n	Percentage
Sex:	Male	3	4.1
	Female	60	82.2
	No response	10	13.7
Age:	23-30	24	32.9
	31-40	12	16.4
	41-50	17	23.3
	51-75	6	8.2
	No response	14	19.2
Years teaching:			
	0-5	30	41.1
	6-10	12	16.4
	11-20	20	27.4
	over 20	11	15.1
	No response	0	0.0
Years at current school:			
	0-5	56	76.7
	6-10	10	13.7
	over 10	7	9.6
	No response	0	0.0

N = 73

ranged from one to forty-seven years with a mean number of teaching years of 10 years 8 months. Teaching experience of the participants provided a bimodal distribution with the largest numbers of teachers being in the 0-5 years of experience range and in the 11-20 years of experience

range. Most of the participants (76.7%) had been teaching at their particular school less than five years. Since all of the participating schools were urban in nature, a higher than normal rate of turnover was expected.

Analysis of the Educational Technology Survey

As previously described, all the participants completed an Educational Technology Survey (ETS), developed by the researcher. The purpose of this survey was to provide the researcher with a measure of the type and level of adoption of computer usage by the elementary school teachers participating in the study. The survey employed a 5 point Likert scale as a measure of usage by the respondents. This section reports the results from the survey.

Length of Use

Table 2 presents data describing the length of time the participants had been using a computer at the time of this study. As the data indicate, there was a wide range of usage by teachers in this study with 5.5% of the population being new users and 35.6 % with 5 or more years of usage. The average duration of computer use by all of the study's participants was 3.25 years.

Table 2

Length of Time of Computer Usage

Years of Use	Number of teachers	Percent of teachers
0	4	5.5
1	9	12.3
2	14	19.2
3	10	13.7
4	10	13.7
5 or more	26	35.6

N = 73

Location of Computer Used

In addition to the length of use, the researcher was also interested in the location of the computer(s) used by the participants. Table 3 provides the participant's responses to the Educational Technology Survey item about the location of the computer used. Of particular importance is that over half of the teachers have access to computers both at home and at school.

Instructional Applications

Tables 4 provides data concerning the type and frequency of instructional computer applications used by the participants with their students. The respondents were asked to answer this section of the

Table 3

Location of the Computer the Participants Use

Location of computers used	Number of teachers using computers	Percentage of teachers
At home	44	60.3
Classroom	53	72.6
Other (in-school)	44	60.3
Other (out-school)	24	32.9

N = 73

survey using a Likert scale. The responses on the scale range were 0 = never used, 1 = used yearly, 2= monthly use, 3 = weekly use, and 4 = daily use of the instructional program. The most frequently used type of instructional computer application by the participants were programs that provide (1) drill and practice activities, and (2) educational games for students. The participants reported using tutorials and simulations least often.

Generic Program Use

Tables 5 and 6 provide information about the type of computer programs personally used by the participants in performing their duties as classroom teachers. Specifically, respondents reported which

applications they used with students. The survey data presented in Tables 5 and 6 were also used to generate the Level of Adoption Index.

Table 4

Type and Frequency of Programs Used by Teachers

Type of Software	M	sd
Drill & Practice	2.37	1.73
Tutorial	1.52	1.73
Games	2.41	1.73
Simulations	0.96	1.52
Problem Solving	1.74	1.76

N = 73

It is this index that was used to determine relationships between the participants' Level of Adoption and the three other assessment tools, i.e., LTM, TSI, & CSI. These sections also employed a Likert scale. The participants in this study answered questions by indicating 0 = no personal use of applications, 1 = yearly use, 2 = monthly use, 3 = weekly use, and 4 = daily use.

As the data in Table 5 indicate, the participants reported using word processing, telecommunications (e-mail), and graphic/drawing

applications most often. Grade book, database, hypercard and spreadsheet applications were used less often. Programming languages were the most seldom used application.

When given the same list of computer applications as used in Table 5, the participants indicated the same trend in usage (Table 6) with their students. The only significant change was the increased use of programming languages.

Table 5

Applications Personally Used by Teachers

Survey Item	M	sd
Programming Languages	.45	.99
Word Processing	2.27	1.40
Spreadsheet	.70	1.08
Database	.88	1.34
Grade book	1.03	1.50
Graphic, Drawing	1.34	1.27
Hypercard	.55	1.08
Telecommunication	.56	1.25

N = 73

Note: During the interview phase of this study the researcher learned that many teachers considered teaching students basic MS DOS operating system commands to be teaching "programming languages."

Table 6

Applications Used with Students

Survey Item	M	sd
Programming Languages	.15	.66
Word Processing	1.14	1.52
Spreadsheet	.10	.58
Database	.18	.71
Grade book	.33	.97
Graphic, Drawing	1.32	1.56
Hypercard	.41	1.05
Telecommunication	.26	.93

N = 73

Research Questions

The general purpose of this study was to examine factors that might influence the adoption of computer technology by elementary teachers. Specifically, the study examined the relationship between elementary teachers' learning style, teaching style, attitude toward change, and

intrinsic and extrinsic motivational factors and the teachers' adoption and use of computer technology in the classroom.

The first research question addressed by this study was:

Is there a relationship between elementary teachers' learning style and their adoption of computer technology into their teaching and learning strategies?

This question required a two-part analysis. First, the Learning Type Measure (LTM) was used to determine the preferred learning style of the participants as well as their doing and watching scores. The LTM categorizes the participants into one of four learning preference types. In addition, how they process new learning ,i.e., a watching or doing score, was computed. Secondly, analyses of variance were used to compare the participants' LTM scores and their Level of Use of computer technology.

As the data in Table 7 indicate, 50% of the participants in the study were Learner Type One as defined by the LTM type descriptions. Learner Type One's are interested in facilitating individual growth, thrive on taking time to develop good ideas, tackle problems by reflecting alone, and believe curricula should enhance one's ability to be authentic. Participants were split evenly between type two learners who perceive information abstractly and process it reflectively, and type four learners who perceive information concretely and process actively. Very few of the participants were type three learners. This would indicate that less than

ten percent of the participants had a learning style where they perceive information abstractly and process it actively.

Table 7

Learning Type Measurement of Elementary Teachers

Learner Type	Number of teachers	Percent of teachers
Learning type 1	7	50.00
Learning type 2	3	21.43
Learning type 3	1	7.14
Learning type 4	3	21.43

N = 14

In addition to a specific learning type, the LTM provides a second dimension related to how an individual learns. This dimension of the LTM is the Watching/Doing score (Table 8). According to its developers, this score indicates how the teachers process new learning. Over 70% of the participants in this study prefer Watching first as a strategy for making sense of new learning. Approximately 28% have a predisposition for Doing first and then use that action as a context for introspection. The developers of this instrument also indicate that most "Ones" and "Twos" are Watchers. The results of these analyses are consistent with the

developers findings. As indicated in Table 7, over 70% of the participants in this study were "Ones" and "Twos" during the administration of this instrument. Most "Threes" and "Fours" are doers first then shift to watching. Everyone does both. Preference for watching first then doing, or doing first then watching impacts behavior.

Table 8

Participants Preferences for Learning New Information

	Watching-Doing Preferences				
	Doing <-------Watching			Doing-------> Watching	
Number of teachers	1	3	6	3	1
Percent of teachers	7.1	21.4	43	21.4	7.1

N = 14

Table 9 displays the mean scores for teachers reported usage on each of the different computer applications listed on the ETS. In order to determine the existence of relationships between the teacher's learning type and their adoption of technology a set analyses of variance were conducted between the Level of Use scores and the scores on the Learning Type Measure. A Likert scale was employed in reporting the level of use by the study's participants. The scale 's range was 0 = no use, 1 = yearly use, 2 = monthly use, 3 = weekly use, and 4 = daily use

for this measure only. As Table 10 indicates no significant differences ($p<.05$) were found between the teacher's learning style and the levels of computer use.

Table 9

Mean Scores and Standard Deviations of Level of Use Scores and the LTM Classifications

Type of computer applications	M reported usage	sd
Programming Languages	.29	.83
Word Processing	2.50	1.12
Spreadsheet	.50	1.02
Data base	.36	.80
Grade book	1.21	1.63
Graphic, Drawing	.93	.32
Hypercard	.21	.58
Telecommunication	.36	.84
Drill & Practice	1.79	1.19
Tutorial	2.07	1.82
Games	2.43	1.83
Simulations	2.57	1.87
Problem Solving	2.29	1.82

N = 14

Table 10

Analysis of Variance between Level of Use Scores and the LTM Classifications

Type of computer use	*F* ratio	df	p
Programming Languages	1.31	3,10	ns
Word Processing	.26	3,10	ns
Spreadsheet	.39	3,10	ns
Data base	.44	3,10	ns
Grade book	1.31	3,10	ns
Graphic, Drawing	1.19	3,10	ns
Hypercard	1.02	3,10	ns
Telecommunication	1.31	3,10	ns
Drill & Practice	.93	3,10	ns
Tutorial	.44	3,10	ns
Games	.52	3,10	ns
Simulations	1.02	3,10	ns
Problem Solving	.27	3,10	ns

N = 14

The second research question addressed by this study was:

Is there a relationship between elementary teachers' teaching style and their adoption of computer technology into their teaching and learning strategies?

As with the previous research question, question two required a two-part analysis. First an analysis of the participants scores on the Teaching Style Inventory (TSI) was conducted. Second, correlations were run between the participants' teaching style scores and their Level of Adoption Index score.

Table 11 provides an analysis of the participants' scores on the TSI. The TSI provides a set of eight scores to describe a teacher's teaching style profile. Each of these eight scores places a teacher on a continuum that extends from the traditional instructional methods to completely individualized instructional methods. The eight scores speak to a teacher's use of instructional plans, his or her teaching methods, teaching environment-student groupings, evaluation techniques, teaching characteristics and classroom management, and educational philosophy.

Based on the data presented in Table 11, it appears that certain patterns exist that indicate that teachers in this sample are in a state of transition. While they are rated as "somewhat traditional" in instructional planning, they are rated as in a state of transition in the areas teaching methods, teaching environment, and teaching characteristics. This

sample of teachers is also rated as "somewhat individualized" in room design, educational philosophy, and student groupings.

The scores on the TSI teaching style profile were correlated with the scores on the Level of Adoption Index. As Table 12 shows, there

Table 11

The Mean Scores, Standard Deviations, and Preferred Teaching Styles of Elementary School Teachers

Instructional Category	M	SD	Teaching Style Rating
Instructional Plan	120.86	25.52	Somewhat Traditional
Teaching Methods	49.30	8.44	Transitional
Student Grouping	64.48	7.43	Somewhat Individual
Room Design	75.52	18.40	Somewhat Individual
Teaching Environment	110.35	25.59	Transitional
Evaluation Techniques	79.87	20.14	Somewhat Traditional
Teaching Characteristics	67.36	10.34	Transitional
Educational Philosophy	170.57	27.71	Somewhat Individual

N = 23

are no significant relationships between the teaching styles of the participants and their level of adoption of computer technology.

The third research question addressed by this study was: **Is there a relationship between elementary teachers' attitude toward change and their adoption of computer technology into their teaching and learning strategies?**

Like the previous research questions, this question required a two part analysis. First the participants scores from the Change Seeker Index (CSI) were analyzed and then they were correlated with the Level of Adoption Index (LAI).

Table 12

Correlation of the Level of Adoption Index with the Teaching Style of Elementary Teachers

Teaching Style Variable	r	df	p
Instructional Plan	-.11	22	ns
Teaching Methods	-.09	22	ns
Student Grouping	-.33	22	ns
Room Design	-.08	22	ns
Teaching Environment	-.06	22	ns
Evaluation Techniques	-.06	22	ns
Teaching Characteristics	-.27	22	ns
Educational Philosophy	-.20	22	ns

The CSI was administered to twenty-seven or forty percent of the participants. The 95-item inventory reports change seeking attitudes with a range of scores from 2 at the lowest and to 68 at the highest. In previous administrations of the CSI with college students, psychiatric patients, soldiers, and school teachers (i.e., K-12) reported mean scores have ranged from 47.70 to 53.88 (Garlington & Russell, 1983). The mean scores and standard deviations of the sample in this study are reported in Table 13.

Table 13

The Mean Score and Standard Deviation of the Change Seeker Inventory

Variable	M	sd
CSI Score	49.71	3.98

N = 27

To determine if there was a relationship between the scores on the CSI and computer utilization scores, CSI scores were correlated with the scores on the LAI. Table 14 provides the data from the correlational analysis of the study participants' CSI score and their Level of Adoption Index score.

As the data indicate in Table 14 there was not a significant relationship between the level of computer adoption by the teachers in this study and the Change Seeker Index score.

The fourth research question for this study was: **Is there a relationship between intrinsic and extrinsic factors as elementary teachers' infuse computer technology into their teaching and learning strategies**?

Table 14

Correlation of the Level of Adoption Index with the Change Seeker Inventory

Correlation Variables	r	df	p
CSI and LAI	.37	23	ns

Several questions on the Educational Technology Survey, developed by the researcher, were designed to allow the participating elementary teachers to report their motivation to adopt the computer into 'their teaching. Participants were asked to score three intrinsic and three extrinsic factors, as identified in the review of literature, by indicating to what degree each contributed to their adoption of computers. The

intrinsic factors addressed by the survey were (1) their personal need to be up-to- date, (2) their desire to learn new things, and (3) their personal commitment to their students' learning. The extrinsic factors addressed by the survey were (1) encouragement from peers, (2) encouragement from the principal, and (3) availability of training. Table 15 shows the results for these questions.

Correlational analyses were conducted between the scores of the intrinsic factors and extrinsic factors and their corresponding Level of Adoption Index Scores. The results of these analyses are presented in Table 16. As the data in Table 16 indicate, there is a significant relationship between the adoption of computer technology and extrinsic factors.

The final research question addressed by this study was: **Is there a relationship between elementary teachers' teaching experience, age, and other demographic factors and their adoption of computer technology into their teaching and learning strategies?**

To answer this question a set of correlations were computed between the demographic data collected by the ETS (Part A) and the technology use and adoption data collected in Parts C and D of the ETS. The results of these analyses indicate that there were no significant relationships between the participants' age, teaching experience, experience at this school and their personal use or use with students of

Table 15

Mean Scores and Standard Deviations on the Intrinsic and Extrinsic Motivation Questions of the ETS.

Motivational Variable	M	sd
Intrinsic	8.89	2.87
Extrinsic	9.77	2.25

N = 73

Note: Intrinsic and extrinsic values are the sum of values for three questions for each variable on the ETS.

Table 16

Correlation of the Level of Adoption Index with Intrinsic and Extrinsic Motivation Factors

Motivational Variable	r	df	p
Intrinsic	.13	72	ns
Extrinsic	.32	72	.01

microcomputers (See Table 17). As the data indicated, the demographic variables such as age did not significantly relate to the level of adoption index. Other demographic variables were not significantly related to the level of adoption index.

Table 17

Correlation between the Level of Adoption Index and Selected Demographic Items of the *Educational Technology Survey*

Demographic Variable	r	df	p
Age	.074	72	ns
Education Level	-.094	72	ns
Teacher Assignment	.112	72	ns
Years Teaching	-.246	72	ns
Years at School	-.149	72	ns
Length of Computer Use	.408	72	ns

Summary

This chapter has presented analyses of the factors that may lead to the adoption of technology by the elementary teachers in this study. The factors that were analyzed included the demographics of the study population, the participants' teaching styles, learning styles, intrinsic and extrinsic motivation factors, and the participants' attitudes toward change. Based on the results of these data analyses the following conclusions may be drawn:

(1) there were no significant relationships between the participants' preferred learning style, as measured by the Learning Type Measure, and their adoption of computer technology.

(2) there were no significant relationships between the participants' preferred teaching style and their adoption of computer technology.

(3) there were no significant relationships between the participants' attitude toward change and their adoption of computer technology.

(4) there were no significant relationships between intrinsic motivation factors and the participants' adoption of computer technology.

(5) there was a significant relationship between extrinsic motivation factors ($p<.01$) and the participants' adoption of computer technology.

(6) there were no significant relationships between the participants' teaching experience, age, and other demographic factors and their adoption of computer technology.

The conclusions, summaries, implications and recommendations for further study are presented in Chapter Five.

CHAPTER FIVE

Summary, Conclusions and Recommendations

Introduction

This chapter provides a discussion of the major and secondary findings, implications and explanations of conclusions, and finally recommendations for further study. The purpose of the study was to investigate the relationship, if any, between the adoption of computer technology by elementary school teachers and their preferred teaching style, learning style, intrinsic and extrinsic motivation factors, and their attitude toward change. This study investigated factors directly related to how individual teachers react to change, how teachers learn, how they teach, and how they adopt new tools and teaching strategies. The underlying premise of this study was that it is the individual teacher that plays the central role in determining the adoption of computer technology in the classroom.

Discussion

The first research question in this study was: Is there a relationship between elementary teachers' learning style and their adoption of computer technology into their teaching and learning strategies?

Based on the analyses of data conducted in the preceding chapter, the results indicated that there were no relationships between the study participants' learning style as measured by the Learning Type Measure

and their adoption of computer technology into their teaching and learning strategies.

Teachers in this study tended to be type one learners who perceive information concretely and process it reflectively. These teachers learn by listening and sharing ideas. As teachers, they prefer to use discussion, group work, and realistic feedback. The lowest reported learning type was learning type three. These teachers are more interested in productivity and competence. As teachers, they encourage practical applications, like technical skills and hands-on activities, and they lack team work skills. Although this information maybe of value in the design and development of teacher training activities, this study produced no significant relationships between elementary teachers' preferred learning style and their adoption of computer technology.

The second research question was: Is there a relationship between elementary teachers' teaching style and their adoption of computer technology into their teaching and learning strategies?

After a complete analysis of the statistical data, no significant relationship between the teachers' teaching styles and their adoption of computer technology was identified. In addition to the data used for the statistical tests for significance (e.g. mean score on the TSI and the LAI), fifty-three observations were conducted by the researcher at the seven participating schools.

Although the preferred teaching styles of the participants were lecture and small group, the data collected in this study indicated that the

participants were in a state of transition. The teachers in this study indicated that they used the lecture method of instruction frequently, but individualized instruction was also being used occasionally. The data indicated that they were moving from traditional teaching methods towards more individualized student instructional methodology.

Research question three was: Is there a relationship between elementary teachers' attitude toward change and their adoption of computer technology into their teaching and learning strategies?

As shown by the analyses of the data, the teachers in this study did not indicate that they were high change seekers. Analysis of the data demonstrated that there was no significant relationship apparent between teachers' attitude toward change and their adoption of computer technology into their teaching and learning strategies. The lack of significance may have been due to a small sample size (n=23). Garlington and Shimota (1964) in their original study reported similar results with a sample of 21 female school teachers.

Research question four was: Is there a relationship between intrinsic and extrinsic factors as elementary teachers adopt computer technology into their teaching and learning strategies?

There was a significant relationship identified between the extrinsic scale and the adoption of computer technology into teaching and learning strategies. Three questions on the ETS measured the extrinsic factors for the adoption and use of computers. The first was encouragement from other teachers. The second was the availability of training. The third

was encouragement of the principal. The relationship between intrinsic motivational factors and the adoption of computer technology was not significant.

Research questions five was: Is there a relationship between elementary teachers' teaching experience, age, and other demographic factors and their adoption of computer technology into their teaching and learning strategies? Analyses of the data indicated that no significant relationships were found between the level of adoption of computer technology by this study's participants and their demographic profile.

Conclusions of the Study

The major findings in this study were: The highest instructional use of the computer by teachers in this study was in drill and practice followed by the use of games. This finding was important because the results confirm the review of the literature which indicated that drill and practice was reported to be the most frequently used computer use by elementary school teachers.

Of equal importance maybe that after almost a decade of available computer training, teachers are still using the computer sparingly. Teachers' most frequently reported category of usage with students in this study was "on a weekly basis." In addition, computers were frequently found in laboratory settings. Most of the teachers in the study had at least one computer in the classroom, but most of the computers in schools were found and used by students in the computer lab. One

positive finding that emerged was that 60% percent of the teachers reported having a computer in their homes.

The focus of this study was on the relationships among elementary teachers learning style, teaching style, intrinsic and extrinsic motivational factors, attitude toward change, and their adoption of computer technology into their teaching and learning strategies. First, the data indicated that there was no significant relationship between the preferred learning style of this study's participants as defined by the Learning Type Measure and their adoption of computer technology. Second, there was no significant relationship between level of computer technology adoption by the teachers in this study and their preferred method of teaching as described by the Teaching Style Inventory. Third, the results indicated that the relationship between the participants' attitude toward change as measured by the Change Seeker Index and their adoption of computer technology was not significant. The fourth examination involved the relationships among selected demographic variables (i.e., age, teaching experience, and sex), and the level of computer technology adoption. These results were not significant. The final investigation examined the relationship among intrinsic and extrinsic motivational factors and the adoption of computer technology by elementary teachers. The results indicated no significant relationships among the intrinsic motivational factors (e.g., commitment to student learning) and the adoption of computer technology by elementary teachers into their teaching and learning strategies. A significant relationship was found between the

extrinsic motivational factors (e.g., support of the principal) and the adoption of computer technology by the teachers in this study.

Implications

Preservice Teacher Education

The study provided some key implications for preservice teacher education programs. Based upon the review of the literature several implications can be made. One implication is that computer technology should be incorporated into the course work of future teachers. Preservice programs should model the expected use and integration of computer technology into teaching and learning of all subject matter (Savenye, 1993). The preferred teaching style of the preservice teacher should not be a factor in the adoption of computer technology because computer usage can be incorporated into all teaching methodologies. Another implication for preservice teacher education programs is that teachers are central to students learning with technology. Therefore, the teacher must have acquired a comfort level of computer use that would encourage the use of technology by their students which is indicated by the teachers' attitude towards technology and the willingness to use it in their teaching and learning.

Inservice training

There are various implications this study has for those planning and directing inservice training programs. To use technology effectively, teachers need time to develop their personal use and adoption of technology into their teaching and learning strategies. The review of the

literature suggest support from the principal and other administrators creates an atmosphere that encourages innovation adoption and continued use (Polin, 1992; Sheingold & Hadley, 1990).

According to the review of the literature for this study the current approach to inserving teachers does not encourage permanent adoption of computer technology. Usually a one size fits all, short inservice courses to introduce and to train a large group of teachers in a limited time frame is the manner in which many teachers learn about computer technology and innovations. This training structure is limited and does not promote long term adoption of the innovation. Teachers, like their students, need to have access to varied teaching and learning strategies that encourage and aid in the adoption and infusion of computer technology into their own teaching and learning styles (Sheingold & Hadley, 1990; OTA, 1995).

Promoting the adoption of technology

It has been hypothesized that technology using teachers can help improve student learning and motivation to learn, address the different learning styles of their students, accommodate for special needs, and expose students to a wide variety of information and experiences via the computer. But, teachers must first adopt technology on a personal level before full infusion into their teaching and learning strategies.

Teachers are students also. They attend conferences, workshops, college courses, and other inservice activities to meet recertification requirements, learn new instructional methods, and stay current in their

field. Adoption of technology into teaching and learning strategies must also be promoted by those who teach, inspire, oversee, supervise, facilitate the professional development of teachers. Teachers need time, access, training and support to effectively adopt and infuse computer technology into their own teaching and learning strategies (OTA, 1995).

What this study has shown is the importance of extrinsic factors. The analyses of the motivational factors that lead to computer adoption by the teachers in this study included the encouragement of other teachers, availability of training, and the encouragement of the principal. The one of the critical adoption factor was the support and encouragement of the local administration. The principal can make a difference.

Recommendations for Further Study

Based on the analyses of the data, the researcher has several recommendations for future replications of this study. A larger sample size might provide different results and findings that may be more generalizable. Second, each participant should have completed all of the research instruments (Teaching Style Inventory, Change Seeker Index, Learning Type Measure, Educational technology survey, and the innovation adoption matrix). Third, more time should be allotted for the completion of all of the research instruments. Finally, the scheduled data collection period should be conducted during the middle of the school year, and the researcher should conduct periodic observations and interviews to validate the teachers responses on the survey instruments. These observations should span the school year rather than at the end of

the school term when teachers are more concerned with end-of-the-year tasks.

There are several questions that still remain unanswered by this study but were encountered in the review of the literature that may require further study. One question is, if teachers have various preferred learning styles, what are the most efficient ways to adjust technology training so that all learning styles are accommodated? Two, further study is needed to determine if teachers who have adjusted their teaching style and are clearly more individualized in their delivery of instruction have a higher level of computer technology adoption. Third, how much computer technology should elementary school teachers be using in their teaching and learning strategies? A fourth question is if the study focused on teachers that taught grades 7 to 12 would the results be significantly different? Another question is whether gender is a factor in the level of adoption of computer technology? Do male teachers have a higher level of computer adoption than female teachers? Finally, what, if any, impact do exceptional education classes have on teachers? In these classes individual educational plans are the norm. Is there a higher level of computer usage among the teachers of these students?

Predicting the future is precarious, educators are facing challenges that require them to anticipate changes taking place in society globally and to adapt the curriculum to address these changes. It has become apparent that technology literacy and fluency will be required by all citizens to navigate the 21st century successfully. Preparing new

teachers and retraining current teachers to take full advantage of the attributes of computer technology to enhance individual teaching and learning strategies will promote student learning and student abilities.

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APPENDIX A

INITIAL EDUCATIONAL TECHNOLOGY SURVEY

Educational Technology Survey

Part I - Personal Data

(1)._____ (2) School _____
First Name MI Last Name

(3) Date of Birth __/__/__ (4) Sex: ___M ___ F

(5) Check your current educational level & indicate major:

___ Undergraduate Major: _____
___ Masters Degree Major: _____
___ Advanced Grad Major : _____

(6) Teacher Assignment: (Check one)

___ Regular Teacher ___ Special Ed. Teacher Other: _____

(7) Total years teaching ____ (8) Years at current school _____

Part II - Computer Use

(9) Do you have a computer for your personal use?

A. At home: ___ Yes ___ No
B. In your classroom: ___ Yes ___ No
C. Another location in your school: ___ Yes ___No
D. Another location? Specify _____

(10) Which applications do you personally use? Please use the following code on each application program.

1-Never 2-Daily 3-Weekly 4-Monthly 5-Yearly

___ A. Programming languages
___ B. Word processing
___ C. Spreadsheet
___ D. Data base
___ E. Gradebook program
___ F. Graphic, drawing & painting
___ G. Hypercard, hyper studio or linkway
___ H. Telecommunications or email

(11) How long have you been using a computer? (Check one)

__less than 1 year __less than 3 years
__less than 2 years __less than 4 years
__5 years or more

(12) Which programs do you have your students use? Please use the following

code on each application program.

1-Never 2-Daily 3-Weekly 4-Monthly 5-Yearly

Application Programs

___ A. Programming languages (Logo, BASIC, PASCAL etc.,)
___ B. Word processing
___ C. Spreadsheet
___ D. Data base
___ E. Gradebook program
___ F. Graphic, drawing & painting
___ G. Hypercard, hyper studio or linkway
___ H. Telecommunications or email

1-Never 2-Daily 3-Weekly 4-Monthly 5-Yearly

Instructional Programs

___ I. Drill & practice (Used to reinforce a skill that has been learned)
___ J. Tutorial (Used to introduce new material)
___ K. Games (Programs that provide competition and practice)
___ L. Simulations (Represents real-life situations on the computer)
___ M. Problem solving (Primary focus is on thinking skills)

(13) Circle the number that best describes how you group students to use the computer in your classroom or computer laboratory.

1-Never 2-Rarely 3-Occasionally 4-Frequently 5-Always

1	2	3	4	5	A. Student works alone
1	2	3	4	5	B. One-to-one interaction with teacher
1	2	3	4	5	C. Pairs (2 students)
1	2	3	4	5	D. Small groups (3-8 students)
1	2	3	4	5	E. One large group (i.e., all students at a computer)

14. Which of the following computer components do you use? (Check each that applies)

At School	At Home	
_____	_____	A. Hard drive
_____	_____	B. CD ROM
_____	_____	C. Modem
_____	_____	D. Scanner
_____	_____	E. Video/laser disk
_____	_____	F. Overhead/LCD presentation panel
_____	_____	G. Dot matrix printer
_____	_____	H. Ink jet/Laser printer

_____ _____ l. Network access to internet

15. Overall how would you describe your students satisfaction with using the computer? (Circle one)

Very Negative				Very Positive
1	2	3	4	5

16. Overall how would you describe your satisfaction with using the computer? (Circle one)

Very Negative				Very Positive
1	2	3	4	5

Comments: _____

_____

_____

APPENDIX B

EDUCATIONAL TECHNOLOGY SURVEY

Educational Technology Survey

A. Personal Information

(1)_____ (2) School _____
First Name MI Last Name

(3) Date of Birth __/__/__ (4) Sex: ___M ___ F

(5) Check your the educational level you have completed & indicate major:
___ Undergraduate Major: _____
___ Masters Degree Major: _____
___ Advanced Grad Major: _____

(6) Teacher Assignment: (Check one)
___ Regular Teacher ___ Special Ed. Teacher Other: _____

(7) Total years teaching ____ (8) Years at current school _____

(9) How long have you been using a computer? (Check one)
___ 1 year ___ 2 yrs ___ 3 yrs ___ 4 yrs ___ More than 5 yrs

(10). What type of computer do you use most of the time?
At home? ___ IBM or Compatible ___ Macintosh ___ Apple II
At school? ___ IBM or Compatible ___ Macintosh ___ Apple II

B. Where do you have a computer for your personal use?

11. At home ..... ___ Yes ___ No
12. In your classroom ..... ___ Yes ___ No
13. Another location in your school .. ___ Yes ___No
14. Another location? Specify _____

C. How often do you personally use the following applications either at home or at school?

___ 15. Programming languages
___ 16. Word processing
___ 17. Spreadsheet
___ 18. Data base
___ 19. Gradebook program
___ 20. Graphic, drawing & painting
___ 21. Hypercard, hyper studio or linkway
___ 22. Telecommunications or email

Use this Scale
0 = Never
1 = Yearly
2 = Monthly
3 = Weekly
4 = Daily

___ Check here and go to section F on the next page (Page 3) if you do not use a computer for instructional purposes in your classroom.

D. Which programs do you have your students use?

Application Programs

___ 23. Programming languages (Logo, BASIC, PASCAL etc.,)
___ 24. Word processing
___ 25. Spreadsheet
___ 26. Data base
___ 27. Gradebook program
___ 28. Graphic, drawing & painting
___ 29. Hypercard, hyper studio or linkway
___ 30. Telecommunications or email

Use this Scale
0 = Never
1 = Yearly
2 = Monthly
3 = Weekly
4 = Daily

Instructional Programs

___ 31. Drill & practice (Used to reinforce a skill that has been learned)
___ 32. Tutorial (Used to introduce new material)
___ 33. Games (Programs that provide competition and practice)
___ 34. Simulations (Represents real-life situations on the computer)
___ 35. Problem solving (Primary focus is on thinking skills)

E. Circle the number that best describes how you group students when using the computer(s).

1-Never		2-Rarely		3-Occasionally	4-Frequently	5-Always
1	2	3	4	5	36.	Student works alone
1	2	3	4	5	37.	One-to-one interaction with teacher
1	2	3	4	5	38.	Pairs (2 students)
1	2	3	4	5	39.	Small groups (3-8 students)
1	2	3	4	5	40.	One large group (i.e., all students at a computer)

F. Which of the following computer components do you use at home or at school? (Check each that applies)

At School		At Home
_____	41. Hard drive	_____
_____	42. CD ROM	_____
_____	43. Modem	_____
_____	44. Scanner	_____
_____	45. Video/laser disk	_____
_____	46. Overhead/LCD presentation panel	_____
_____	47. Dot matrix printer	_____
_____	48. Ink jet/Laser printer	_____
_____	49. Network access to FIRN, Internet, etc.,	_____

G. Overall, how have the following motivated you to adopt the use of computers.

Use this Scale
0 = None
1 = Very little
2 = Somewhat
3 = A Lot
4 = The most

___ 50. Encouragement from other teachers
___ 51. My personal need to be up-to-date
___ 52. The availability of training
___ 53. The encouragement of my principal
___ 54. I just like to learn new things
___ 55. Commitment to my students' learning

Neg to Pos		
1-2-3-4-5	56.	Overall, how would you describe your students' satisfaction with using the computer?
1-2-3-4-5	57.	Overall, how would you describe your satisfaction with using the computer?

Comments: _____

_____

_____

_____

APPENDIX C

TEACHING STYLE INVENTORY

Teaching Style Inventory by Rita Dunn and Kenneth Dunn

I. Instructional Planning

Directions: Choose the number that best describes how often you use each of the following planning techniques.

1. Diagnosis and prescription for each student
2. Whole class lessons
3. Contracts, learning activity packages, or instructional packages
4. Creative activities with student options
5. Programmed materials or drill assignments
6. Small group assignments
7. Task cards or games
8. Objectives
9. Peer tutoring or team learning
10. Role playing or simulations
11. Brainstorming or circles of knowledge

1= Never
2= Rarely
3= Occasionally
4= Frequently
5= Always

II. Teaching Methods

Directions: Choose the number that best describes how often you use each of the following teaching methods.

12. Lecture (whole class)
13. Small groups (3-8)
14. Media (films, tapes, etc.)
15. Class discussion (question-answer)
16. Individualized (diagnosis and prescription for each student)

1= Never
2= Rarely
3= Occasionally
4= Frequently
5= Always

III. Teaching Environment-Student Groupings

Directions: Choose the number that best describes how often you use each of the following type of groupings.

17. Several small groups (3-8 students)
18. Pairs (2 students)
19. Independent study assignments (student works alone)
20. One-to-one interactions with teacher
21. Two or more of the above groupings at one time
22. One large group (entire class)
23. Rows of desks

1= Never
2= Rarely
3= Occasionally
4= Frequently
5= Always

24. Small groups of 3-8 students
25. Learning stations or interest centers
26. A variety of areas
27. Individual and small-group (2-4) alcoves, dens,etc
28. Three or more of the above arrangements at the same time
29. Varied instructional areas are provided in the classroom for different, simultaneous activities
30. Nutritional intake is available for all students as needed.
31. Instructional areas are designed for different groups that need to talk and interact
32. Varied time schedules are in use for individuals
33. Students are permitted to choose where they will sit and/or work
34. Many multisensory resources are available in the classroom for use by individuals and groups
35. Alternative arrangements are made for mobile, active or overly talkative students

1= Never
2= Rarely
3= Occasionally
4= Frequently
5= Always

IV. Evaluation Techniques

Directions: Choose the number that best describes how often you use each of the following evaluation techniques.

36. Observation by moving from group to group and among individuals
37. Teacher made tests
38. Student self-assessment tests.
39. Performance tests (demonstrations rather than written responses)
40. Criterion-referenced achievement tests based on student self-selected, individual objectives
41. Criterion-referenced achievement tests based on small-group objectives
42. Standardized achievement tests based on grade- level objectives
43. Criterion-referenced achievement tests based on the individual student's potential

1= Never
2= Rarely
3= Occasionally
4= Frequently
5= Always

V. Teaching Characteristics and Classroom Management

Directions: Choose the number that best describes you as a teacher.

I tend to be:

44. Concerned with how students learn (learning style)	1= Not at all 2= Not Very 3= Somewhat 4= Very 5= Extremely
45. Prescriptive (with student options)	
46. Demanding-with high expectations based on individual ability	
47. Evaluative of students as they work	
48. Concerned with how much students learn (grade level standards)	
49. Concerned with what students learn (grade level curriculum)	
50. Lesson plan oriented	
51. Authoritative to reach group objectives	

VI. Educational Philosophy

Directions:Choose the number that best describes your attitude toward each of the following approaches and concepts.

52. Open education	1= Strognly Disagree 2= Disagree 3= Undecided 4= Support 5= Strongly Support
53. Diagnostic-prescriptive teaching	
54. Multiage Groupings	
55. Matched teaching and learning styles	
56. Alternative education	
57. Student-centered curriculum	
58. Behavioral or perfomanced objectives	
59. Humanistic education	
60. Independent study	
61. Individualized instruction	
62. Traditional education	
63. Whole-group achievement	
64. Grade-level standards	
65. Teacher-dominated instruction	

APPENDIX D

CHANGE SEEKER INDEX

CHANGE SEEKER INDEX

W. K. Garlington & H. E. Shimota

DIRECTIONS: Please answer each item by choosing either (A) True or (B) False.

1. I think a strong will power is a more valuable gift than a well-informed imagination.
2. I like to read newspaper accounts of murders and other forms of violence.
3. I like to conform to custom and to avoid doing things that people I respect might consider unconventional.
4. I would like to see a bullfight in Spain.
5. I would prefer to spend vacations in this country, where you know you can get a good holiday than in foreign lands that are colorful and "different".

6. I often take pleasure in certain non-conforming attitudes and behaviors.
7. In general, I would prefer a job with a modest salary, but guaranteed security rather than one with large, but uncertain earnings.
8. I like to feel free to do what I want to do.
9. I like to follow instructions and to do what is expected of me.
10. Because I become bored easily, I need plenty of excitement, stimulation, and fun.

11. I like to complete a single job or task at a time before taking on others.
12. I like to be independent of others in deciding what I want to do.
13. I am well described as a meditative person, given to finding my own solutions instead of acting on conventional rules.
14. I much prefer symmetry to asymmetry.
15. I often do whatever makes me feel cheerful here and now, even at the cost of some distant goal.

16. I can be friendly with people who do things which I consider wrong.
17. I tend to act impulsively.
18. I like to do routine work using a good piece of machinery or apparatus.
19. People view me as a quite unpredictable person.
20. I think society should be quicker to adopt new customs and throw aside old habits and mere traditions.
21. I prefer to spend most of my leisure hours with my family.
22. In traveling abroad I would rather go on an organized tour than plan for myself the places I will visit.
23. I like to have lots of lively people around me.
24. I like to move about the country and to live in different places.
25. I feel that what this world needs is more steady and "solid" citizens rather than "idealist" with plans for a better world.

26. I like to dabble in a number of different hobbies and interests.
27. I like to avoid situations where I am expected to do things in a conventional way.
28. I like to have my life arranged so that it runs smoothly and without much change in my plans.
29. I like to continue doing the same old things rather than to try new and different things.
30. I would like to hunt lions in Africa.

31. I find myself bored by most tasks after a short time.
32. I believe that it is not a good idea to think too much.
33. I always follow the rule: business before pleasure.
34. I enjoy gambling for small stakes.
35. Nearly always I have a craving for more excitement.

36. I enjoy doing "darling" foolhardy things "just for fun".
37. I see myself as an efficient, businesslike person.
38. I like to wear clothing that will attract attention.
39. I cannot keep my mind on one thing for any length of time.
40. I enjoy arguing even if the issue isn't very important.

41. It bothers me if people think I am being too unconventional or odd.
42. I see myself as a practical person.
43. I never take medicine on my own, without a doctor's ordering it.
44. From time to time I like to get completely away from work and anything that reminds me of it.
45. At times I have been very anxious to get away from my family.

46. My parents have often disapproved of my friends.
47. There are several areas in which I am prone to doing things quite unexpectedly.
48. I would prefer to be a steady and dependable worker than a brilliant but unstable one.
49. In going places, eating, working, etc. I seem to go in a very deliberate, methodical fashion rather than rush from one thing to another.
50. It annoys me to have to wait for someone.

51. I get mad easily and then get over it soon.
52. I find it hard to keep my mind on a task or job unless it is terribly interesting.
53. For me planning one's activities well in advance is very likely to take most of the fun out of life.
54. I like to go to parties and other affairs where there is lots of loud fun.
55. I enjoy lots of social activity.

56. I enjoy thinking up unusual or different ideas to explain everyday events.
57. I seek out fun and enjoyment.
58. I like to experience novelty and change in my daily routine.
59. I like a job that offers change, variety, and travel, even if it involves some danger.
60. In my job I appreciate constant change in the type of work to be done.

61. I have the wanderlust and am never happy unless I am roaming or traveling about.
62. I have periods of such great restlessness that I cannot sit long in a chair.
63. I like to travel and see the country.
64. I like to plan out my activities in advance, and then follow the plan.
65. I like to be the center of attention in a group.

66. When I get bored I like to stir up some excitement.
67. I experience periods of boredom with respect to my job.
68. I admire a person who as strong sense of duty to the things he believes in rather than a person who is brilliantly intelligent and creative.
69. I like a job that is steady enough for me to become expert at it rather than one that constantly challengers me.
70. I like to finish any job or task that I begin.

71. I feel better when I give in and avoid a fight, than I would it I tried to have my own way.
72. I don't like things to be uncertain and unpredictable.
73. I am known as a hard and steady worker.
74. I would like the job of a foreign correspondent for a newspaper.
75. I used to feel sometimes that I would like to leave home.

76. I find my interests change quite rapidly.
77. I am continually seeking new ideas and experiences.
78. I like continually changing activities.
79. I get a lot of bright ideas about all sorts of things--too many to put into practice.
80. I like being amidst a great deal of excitement and bustle.

81. I feel person just can't be too careful.
82. I try to avoid any work which involves patient persistence.
83. Quite often I get "all steamed up" about a project, but then lose interest in it.
84. I would rather drive 5 miles under the speed limit than 5 miles over it.
85. Most people bore me.

86. I like to find myself in new situations where I can explore all the possibilities.
87. I much prefer familiar people and places.
88. When things get boring, I like to find some new and unfamiliar experience.
89. If I don't like something, I let people know about it.
90. I prefer a routine way of life to an unpredictable on full of change.

91. I feel that people should avoid behavior or situations that will call undue attention to themselves.
92. I am quite content with my life as I am now living it.
93. I would like to be absent from work (school) more often than I actually am.
94. Sometimes I wanted to leave home, just to explore the world.
95. My life is full of change because I make it so.

APPENDIX E

INTERVIEW QUESTIONS

INTERVIEW QUESTIONS

1. WHICH SOFTWARE PROGRAMS DO YOU HAVE YOUR STUDENTS USE?
2. HOW OFTEN DO YOU PERSONALLY USE THE COMPUTER?
3. HOW LONG HAVE YOU BEEN USING A COMPUTER?
4. WHAT TYPE OF COMPUTER DO YOU USE MOST OF THE TIME?
5. WHERE DO YOU HAVE A COMPUTER FOR YOUR PERSONAL USE?
6. OVERALL, WHAT HAS MOTIVATED YOU TO ADOPT AND USE COMPUTERS?
7. HOW WOULD YOU DESCRIBE YOUR STUDENTS' SATISFACTION WITH USING THE COMPUTER?
8. HOW WOULD YOU DESCRIBE YOUR SATISFACTION WITH USING THE COMPUTER?
9. ANY ADDITIONAL COMMENTS OR SUGGESTIONS?
10. WHAT CHANGES IN COMPUTER USE WOULD YOU LIKE TO SEE IN YOUR SCHOOL?

Additional comments:

VITA

BERNADETTE C. KELLEY

PERSONAL MISSION

My goal is to use the talent, skill, and knowledge I have to enhance and support the environments in which I have the privilege to live and work.

WORK HISTORY

Teaching Experience:

Hempstead Middle School English Teacher 7th and 8th grade	1982-1987
Hempstead High School Adult High School Computer training	1985-1987
Dekalb County Public Schools High School English Teacher Coordinator of in school Computer Laboratory	1987-1988
Atlanta Pubic Schools High School English Teacher	1988-1989
Charlton County Public Schools High School English Teacher	1989-1991
Edward Waters College Assistant Professor of Computer Information Systems	1989-1995
Jacksonville University Adjunct professor for Computer Information Systems	1992

Florida A & M University Assistant Professor of Computer Applications in Education		1995-Present

EDUCATION

Edward Waters College	B. S. English-major Journalism-minor Education-minor	1982
Long Island University C. W. Post College	M. S. Computers in Education	1988
University of North Florida	Doctoral Studies Educational Leadership.	Present

AWARDS/COMMUNITY SERVICE

A member and past officer of Delta Sigma Theta Sorority, Inc. a public service orgainization. A member of Phi Delta Kappa and Phi Kappa Phi Honor Societies.

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