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The Effect of Change Styles on Instructional Technology Use by Elementary School Teachers

Hasan Akyurekoglu

THE EFFECT OF CHANGE STYLES ON INSTRUCTIONAL TECHNOLOGY USE

BY ELEMENTARY SCHOOL TEACHERS

DISSERTATION

Presented in Partial Fulfillment of the Requirements for

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Barry University

By

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Area of Specialization: Educational Computing and Technology

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ABSTRACT

THE EFFECT OF CHANGE STYLES ON INSTRUCTIONAL TECHNOLOGY USE

BY ELEMENTARY SCHOOL TEACHERS

Hasan Akyurekoglu

Barry University, 2011

Dissertation Chairperson: Dr. Joel S. Levine

<u>Purpose</u>

The effect of recent innovations in instructional technologies on classroom teaching and learning is one of the most discussed issues in education (Webber, 2003). The purpose of this causal-comparative study was to investigate the effect of change styles on instructional technology use by elementary school teachers in a classroom setting. A literature review suggested that some elementary school teachers used instructional technologies in their classrooms more frequently than others did; some teachers showed strong resistance in using instructional technologies in their classrooms while some were skeptical using these technologies initially but could be persuaded to use them more often than they did before. Change style of teachers may be a significant factor in instructional technology use in elementary school classrooms.

<u>Method</u>

The independent variables of the study were the change style, gender and teaching experience of participants; the dependent variable was instructional technology use in a classroom setting. The population of this study consisted of elementary school teachers in a school district in Florida. A total of 81 volunteer elementary school teachers from among the population participated in this study. Participants were asked to complete the

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on-line surveys disseminated through the web-based tool on Survey Monkey. The one-way analysis of variance (ANOVA) statistical test was used to compare all sample means simultaneously and to determine whether or not a statistical significance existed somewhere in the data. The Statistical Package for the Social Sciences (SPSS) was used to classify, analyze and organize the collected data. Creswell's (2002) six steps of hypothesis testing method was used in this study.

Major Findings

The findings of this study revealed that there was a significant difference in instructional technology use by elementary school teachers based on their change styles in a classroom setting. However, there was no significant difference in instructional technology use by female elementary school teachers based on their change styles. The findings revealed that there was a significant difference in instructional technology use by male elementary school teachers based on their change styles. The results revealed that there was a significant difference in instructional technology use by beginning elementary school teachers based on their change styles. Similarly, there was a significant difference in instructional technology use by experienced elementary school teachers based on their change styles.

DEDICATION

I dedicated this dissertation to both of my parents, Sadik Akyurekoglu and Ayse

Akyurekoglu. Their never-ending demonstration of love, encouragement and support

gave me the strength to finish this study and follow my dreams.

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CHAPTER I

THE PROBLEM

Introduction

As a technology driven society, the United States of America has been a pioneer in computer and information technology advancements for centuries. These technological developments have been one of the major foundations of this young nation's rise to the top. Hodas , a professor at the School of Education at the University of Washington, stated that "if the State religion of America is Progress, then surely technology provides its icons. It is largely through the production of every-more marvelous machines that we redeem the promise of a better tomorrow, confirm the world's perfectibility, and resorb some to ourselves and to our institutions" (Hodas, 1993, p.6).

The promise of a "better tomorrow," as Hodas stated (1993, p.6), is the backbone of the expectations from these technological advancements. Today's society wants to see these machines at work in its institutions. Therefore, it should not surprise anyone that computer and information technologies have been a major part of our elementary schools since their infusion into the classrooms in the early 1980s. Not only the elementary schools, but also the other institutions have embraced computer technologies for better and more productive work environments. The expectations from these technologies to increase productivity and efficiency in institutions have been on the rise for decades. It is obvious that these expectations will only continue to rise in the future.

A study conducted by the National Center for Education Statistics (2000), *Teachers' tools for the 21st century: A report on teachers' use of technology*, stated that the U.S. Department of Education described computers as the new basic of American

education. As the new basic tools of the elementary school classrooms, the computer and information technologies have been the center of attention for the last few decades. Considering billions of dollars invested on these technologies each year to improve the teaching and learning process in nation's elementary schools, the expectations from these technologies have been going higher and higher each year. Since their introduction into the school system, the effectiveness of these technologies has been one of the most discussed subjects in the field of education. In theory, the use of these technologies creates a powerful learning and teaching environment. According to Dias and Atkinson (2001), the integration of these technologies into curricula with the purpose of increasing the quality of teaching and learning in classrooms have been in a state of evolution since their introduction into education. The infusion of these technologies into the classrooms has changed the schools as education institutions and buildings, classrooms as a location between the walls in a teaching-learning environment, and of course people who are involved in education such as teachers, administrators and students. According to Fullan (2007), the computer and information technologies changed the roles of teachers in a classroom; they changed structure of the school buildings; they changed teaching and learning process; and they changed many other faces of education. Furthermore, Fullan (2007) stated that the recent educational and information technologies have opened new horizons for education. They created a vision for equal opportunity and individualized education for everyone.

Literature review on the recent education spending indicated an increasing amount of educational finances have been invested in instructional technology every year. During 1990s, the United States has spent $38 billion to bring computer and

information technologies in its elementary school classrooms (Benton Foundation, 2001). According to the research findings conducted by the University of California in 2001, the estimated total technology expenditures in FY98 for the elementary school system were about $7.2 billion. This amount was accounted for the 2.7 % of all education spending for the same year (Anderson, R. & Becker, H., 2001). In its recent report to the President on the use of technology to strengthen elementary education in the United States, the President's Committee of Advisors on Science and Technology (PCAST, 1997) reported that public elementary and secondary schools in the United States spent somewhere between $3.5 and $4 billion on computing and networking hardware, wiring and infrastructure enhancements, software and information resources, systems support, and technology-related professional development during the 1995-96 school year. The educational technology budget for the 2000-2001 school year was estimated at $5.8 billion (CEO Forum, 2001). This trend of increasing technology spending seems to have improved the availability of the instructional technologies in the elementary school classrooms. However, the real question to be answered is how often these instructional technologies are used and how they improved education in the classrooms.

Statement of the Problem

There has been a consensus among educators, policymakers, parents and business leaders that the current traditional practices of classroom teaching are not preparing the workforce (students) for the 21st century (CEO Forum, 2001). The students lack the knowledge and skills to thrive and stay competitive in today's technology driven society. Compared to their international counterparts, the students in the 8th grade in the United States scored 18th in science and 19th in mathematics (CEO Forum, 2001). Schools in the

United States should do more to improve quality of teaching and learning process in elementary school classrooms for the students to be competitive in the global economy.

It is a common belief that effective and efficient use of instructional technology in the classrooms can help teachers to achieve educational objectives and deliver students who are prepared to thrive in the next century. Today's teachers have been under pressure to integrate instructional technology into their teaching and learning activities in order to prepare their students for the skills and knowledge they need in the global market. The pressure is coming from all sides, but particularly from the federal government, school administration, professional organizations, local community and businesses, and parents (Bebell, Russell & O'Dwyer, 2004). When we consider that substantial investments have been made in instructional technology in recent decades, this pressure becomes even more evident.

The pressure coming from the federal government is based on the expectation from the computer and information technologies that these tools will bring revolutionary changes into our schools and classrooms; they will reform our educational system (Department of Education, 1993). The Improving America's Schools Act (IASA) of 1994 was passed by the Congress on the promise that the recent instructional technologies would deliver a more efefctive way of teaching and learning in our classrooms. Among the indutrilized nations, having a ranking of 18th in science and 19th in mathematics is not going to prepare our students with the knowledge and skills for today's global economy (CEO Forum, 2001).

The school administrators around the nation have also been under pressure to follow the government's promise of reforming our schools through the computer and

information technologies. These technologies present a range of management issues for administrators. What kind of hardware and sofware to buy? How much training should be given to teachers to be prepared to use these hardware and software? How to provide continious technical support and training? These kinds of questions pressure school administrators to make decisions which may place pressure on their teachers in return. The presence of technology in schools requires the administrators to have leadership skills about how to manage administrative support, professional development of teachers, easy access to technology, and the hardware and software that are compatibale with today's business demands. However, the most important challenge for the school administrators is to understand their teachers' technology needs and prepare them for the technological change in the classrooms.

Business and local community leaders are focused on the outcome: gradutes. They expect the graduates to perform well in society and are ready for a rapidly changing work environment. Teachers are asked to prepare their students for the next century by teaching them how to use the computer and information technologies.

Clinton (1996) announced in his State of the Union Address that every classroom in the United States would be connected with the Internet, and with each other. In September of the same year, Clinton signed a bill that would fund the Department of Education for 26.3 billion in order to achieve his vision. In the light of increasing technology expenditures every year by the elementary schools, and the demands coming from all sides, the teachers have been under pressure to integrate these technologies into teaching and learning in order to have their students ready for the next century. In his 1996 State of the Union Address, Clinton (1996) stated an initiative to integrate these

technologies into teaching and learning activities. He provided a vision of classrooms connected with the world through the Internet, with each other by emerging computer and information technologies. He envisioned teachers to be trained and ready to use and teach with technology. The leaders of businesses expressed the need for computer-literate graduates ready to enter the workforce (U.S. Department of Labor, 1992). In short, government, business, industry, educational and community leaders have been placing new pressures on elementary school teachers to teach their students to be knowledgeable about computer and information technologies.

However, despite the obvious benefits of the computer and information technologies to improve the teaching and learning process in elementary classrooms, some teachers still remain to be skeptical about the benefits of these technologies (Swanson, 2006). A national survey by Becker (1999) showed that majority of teachers, about 70%, are not using computer and information technologies available to them to enhance teaching and learning. A more recent study by Firek (2003) remains consistent with Becker's findings. As a result, elementary school students are not graduating with the knowledge and skills they need to compete in the real world (Giuliano & Sullivan, 2007).

The literature review shows that there are several reasons for this resistance to integrate instructional technologies into curricula. There are organizational barriers such as lack of adequate equipment (hardware and software), lack of professional support and training, and lack of budget. In addition to organizational barriers, there are individual barriers that have an effect on the use of computer and information technologies in classrooms. These include, but are not limited to, teachers' beliefs that technology does

not produce desired outcomes, teachers' confidence in integrating and using these technologies in the classrooms, and in some cases their age, gender and content areas.

Based on today's research, it is not completely clear yet why some teachers willingly accept the use of the computer related technologies while some others resist any introduction of such technologies into their classrooms. In order to find the answers to such questions, teachers' change styles need to be analyzed and investigated. Teachers' individual preferences to deal with change and situations involving change may be the key factor in determining the instructional technology use of teachers in the classrooms. In some cases, the change styles of teachers may determine the acceptance or resistance of the changes around them. According to Fullan (2007), the recent computer and information technologies have changed the role of teacher in a classroom. Therefore, he suggests, that real change must be analyzed at the school, and particularly, at the individual teacher level. Technology in itself can not change the current education system and it can only make a difference when successfully integrated into the curriculum (Muir-Herzig, 2004). Otto and Albion (2004) suggest that even though the new technologies are widely available in the classrooms, they are not fully integrated into the classroom teaching and learning activities

Teachers' change styles may be the key factor in determining why some teachers embrace instructional technology while some others are less enthusiastic to integrate these technologies into curricula. As a personality trait, the change style determines the level of tolerance for change and the level of risk it implies (Saye & Brush, 1998). Researchers place teachers, in general, along a personal comfort level, which ranges from those who can see the value of time-tested methods, through moderates who accept some

changes and resist some. And, there are some who enjoy adventure and change and embrace any technology (McKenzie, 1994). And, there are some teachers who continuously refuse any computer and informational technology to help them to support and enhance their teaching goals. These teachers are concerned that any form of instructional technologies, particularly computers, will force them to change their teaching styles (Hodas, 1993).

McKenzie (1993) suggested that the best way to bring teachers on board with computer use in classrooms was to change their beliefs about the educational technologies. Teachers need to believe that instructional technologies are worth of their time and effective teaching tools. Thus, they would be able to adapt to these technologies and set their teaching goals accordingly (McKenzie, 1993). It is clear that the integration of instructional technology into teaching and learning may not be possible without the belief and commitment of teachers (Chin & Hortin, 1993). The success of instructional technology implementation in the elementary schools depends largely on the teachers (Evans-Andris, 1996). Technology in itself can not change the current education system and it can only make a difference when successfully integrated into the curriculum (Muir-Herzig, 2004). Some arguments suggest that teachers will either embrace educational technologies or they will resist them. As teachers define instructional technology through their own experiences, they create their own styles of using these technologies to attain their teaching objectives (Evans-Andris, 1996). Therefore, it is critical to investigate, analyze and understand the effect of change styles on the instructional technology use of elementary school teachers in their classrooms. Understanding teachers' individual

preferences to deal with change and situations involving change may help to utilize

instructional technologies in the elementary classrooms more effectively and efficiently.

Purpose of the Study

The purpose of this study is to investigate the effect of change styles on the

instructional technology use by elementary school teachers in a classroom setting. In

elementary school classrooms, there are teachers who change and adapt their teaching

styles based on the technology available to them in the classroom to prepare their

students for the next century. These teachers embrace technology and use it more often

than the other teachers for teaching practices. On the other hand, there are some teachers,

who persist using these technologies at a minimum level, mostly for drill and practice

activities. Also, there are teachers in between these two groups who would use

instructional technology if they believe its teaching potential. Teachers are the

gatekeepers to integrating any kind of instructional technology into curricula. Therefore,

it must be understood why some teachers embrace technology while others refuse it, or

make very limited use of them in the classrooms. As Fullan suggested (2007), for any

kind of educational reform to be effective through these computer and information

technologies, real change must be analyzed at the school, and particularly, at the

individual teacher level. Means (1993) suggested that one of the basic components of

educational reform is the individual teacher. While the schools provide the learning goals

and culture, it is the teacher who decides the way students learn. Evans-Andris (1996)

suggested that despite the availability of computers in elementary school classrooms, the

success of the implementation of these technologies depends on teachers. Otto and

Albion (2004) suggested that even though the new technologies are widely available in

the classrooms, they are not fully integrated into the classroom teaching and learning activities

This study's intention is to investigate the effect of change styles on instructional technology use by elementary school teachers in a classroom setting. A change style reflects an aspect of a teacher's personality. It reflects a teacher's individual preference about dealing with change and situations involving change (Musselwhite & Ingram, 1993). In addition, this study will investigate and analyze the effects of gender and teaching experience on teachers' instructional use of technology in the classrooms based on their change styles.

Theoretical Framework

The constructivist learning theory establishes itself as the theoretical base of this study. By definition, as an educational philosophy, constructivism places the focus of the learning process on the learners. It assumes that learners construct their own knowledge through their own experiences (McNair, 2005).

Although the roots of this theory may be found in Giambattista Vico's writing, an 18th century philosopher, Jean Piaget and John Dewey are seen the first major contemporary philosophers and educationalists to bring the fundamentals of this theory into the light (Thanasoulas, 2001). The learners construct their own concepts and find their own solutions to the problems, thus giving them the authority to learn from their own experiences. These experiences are varied from learner to learner since, as individuals, they differ from each other.

One of the major characteristics of the constructivist learning theory is that personal learning is an active process and it is not a matter of linearly acquiring and

accumulating knowledge. Learning is a continuously ongoing process and every learner has his/her own individual ways of experiencing and keeping that knowledge (Davis, 2004).

From the constructivist learning theory perspective, this study investigates the effect of change styles on instructional technology use by elementary school teachers in a classroom setting. These technologies have forced some teachers to reassess their teaching methods and adjust their strategies to achieve their curricular objectives. Recent computer and information technologies have changed the role of the teacher in a classroom; they changed the structure of the school building; and they changed teaching and learning (Fullan, 2007). The use of technology in the classroom supports the constructivist view of learning in which the teacher becomes the facilitator of learning rather than the source of knowledge (Silverstein, et al., 2000). From a constructivist perspective, students use technology to construct their own understanding of the real world and construct their own concepts and understandings. In today's classrooms, teachers should be facilitators more than lecturers. When teachers are able to create student-centered learning environments in their classrooms, the students are empowered to seek and manipulate information in collaborative, creative and engaging ways. The student-centered learning environments are usually problem-based, project centered, customized to learners' needs, communicative and encourages collaborative activities among students (CEO Forum, 2001).

Research Questions and Hypotheses

Research Questions

The purpose of this study is to the effect of change styles on the instructional technology use by elementary school teachers in a classroom setting. The research questions of this study are:

$R$1:   Is there a difference in technology use based on change styles of elementary school teachers?

$R$2:   Is there a difference in technology use based on change styles of female elementary school teachers?

$R$3:   Is there a difference in technology use based on change styles of male elementary school teachers?

$R$4:   Is there a difference in technology use based on change styles of beginning elementary school teachers?

$R$5:   Is there a difference in technology use based on change styles of experienced elementary school teachers?

Null Hypotheses

The null hypotheses of the study are:

$H_0$1: There is no difference in technology use based on change styles of elementary school teachers

$H_0$2: There is no difference in technology use based on change styles of female elementary school teachers

$H_0$3: There is no difference in technology use based on change styles of male elementary school teachers

$H_0 4$:   There is no difference in technology use based on change styles of beginning elementary school teachers

$H_0 5$:   There is no difference in technology use based on change styles of experienced elementary school teachers

Research Hypotheses

The research hypotheses of the study are:

$H_A 1$:   There is a difference in technology use based on change styles of elementary school teachers

$H_A 2$:   There is a difference in technology use based on change styles of female elementary school teachers

$H_A 3$:   There is a difference in technology use based on change styles of male elementary school teachers

$H_A 4$:   There is a difference in technology use based on change styles of beginning elementary school teachers

$H_A 5$:   There is a difference in technology use based on change styles of experienced elementary school teachers

The change style of a teacher is defined as one of the three styles, which is determined by the Change Style Indicator survey (Appendix A). Based on the scores teachers get from this survey, they are originators, conservatists or pragmatists. The technology use of a teacher is measured in a numeric number by the Technology Use survey (Appendix B). This survey has 32 items regarding teachers' use of technology in the classroom. There are five numeric options for each item. The lowest score a teacher can get is 32 and highest is 160. The greater the score is the higher the teachers'

technology use. A beginning teacher is defined as a teacher who has 3 or less years of teaching experience (these teachers are not eligible for a professional service or continuing contract). An experienced teacher is defined as a teacher who has more than 3 years of teaching experience (these teachers are eligible for a professional service or continuing contract).

Significance of the Study

This study intends to contribute to the current literature by analyzing and investigating the effect of change styles on the instructional technology use of elementary school teachers in a classroom setting. In addition, this study intends to offer some explanations about teachers' gender and technology use based on their change styles; and, teachers' teaching experience and their technology use based on the change styles in the elementary school classrooms.

The current data in the literature about the instructional technology use mostly consists of numerical data (computer student ratio, internet connection to classroom ratio, etc). While this type of data is vital to provide quality education, determining how these technologies are used and how teachers' change styles effect their instructional technology use are even more vital. The success of integrating instructional technologies into classroom teaching much depends on how the teachers adapt to these technologies. Teachers must be affective change agents to be able to make use of these technologies in today's classrooms (UNESCO, 2004). Significant amounts of resources have been invested in instructional technology hardware and software, because these technologies seen as major components to reform elementary school classrooms (Sivin-Kachala & Bialo, 2000). Even though considerable investments have been made on the teachers'

professional training and development about using instructional technology, there is

limited data concerning how teachers' change styles effect their use of instructional

technology in a classroom setting. In order to understand what makes teachers use the

instructional technology based on the student-centered constructivist approaches to

instruction, their change styles need to be investigated and analyzed. In a research study

by Becker and Ravitz (2001) it is determined that there is a correlation between teachers'

frequent use of instructional technology and student-centered constructivist teaching

approaches in classrooms. They concluded that teachers' change process towards a

student-centered teaching instruction requires them to use instructional technology often

in their classrooms. However, a study by Wang (2002) contradicted Becker and Ravit's

conclusions. Wang (2002) reported that there was no correlation between teacher change

to student-centered approach to classroom instruction and frequent computer use. It is

certain that recent instructional technologies have been changing the fundamentals of

teaching and learning process in elementary schools (Fullan, 2007). In order for the

computer and information technologies to improve the teaching and learning process as

expected from these technologies, teachers' change styles should be studied and

analyzed. Fullan indicated that real change must be analyzed at the school, and

particularly, at the individual teacher level for any educational reform through technology

to be a reality.

The findings of this study might help school principals, administrators, policy

makers and professional program developers to make better decisions about the

instructional technology use of their school based on the change styles of their

teachers. The change style of a teacher is an important factor in infusing instructional

technology in classroom teaching and leaning activities. Understanding the effect of the change styles on instructional technology use by teachers might enable educators to make better decisions about instructional technology needs and teachers' professional preparation and continuing education.

Research Design Overview

The purpose of the study is to investigate the effect of change styles of elementary school teachers on their instructional technology use in a classroom setting.

The causal-comparative research approach is selected to test the hypotheses of the study. Since it is focused on the already existing conditions (change style of teachers and their technology use), the causal-comparative approach is the most appropriate approach. According to Gay (1996), the causal-comparative research attempts to determine the reasons for the current status of the phenomena under study. Gay defines the causal-comparative research as " a research in which the researcher attempts to determine the cause, or reason, for existing differences in the behavior or status of groups or individuals" (Gay, 1996, p.321).

The purpose of this research type is to determine the reason that has created the difference in groups or individuals. Isaac & Michael (1997) indicated that causal-comparative research is ex post facto, meaning the researcher collects the data after all events have already occurred. By working on one or more dependent variables of the subject, the researcher seeks out the causes and tries to establish the relationships and their meanings. The researcher attempts to determine the reasons or causes for an existing condition to identify the main factors for a difference between groups or individuals.

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In scientific research, one of the challenging tasks is the search for causes, the reason why some sort of behavior form (DeJong, Monette, & Sullivan, 1998). It is difficult, because it can not be directly observed. Why some teachers embrace technology use in the classroom? Why some teachers resist any acceptance of diffusion of technology in their teaching? Through causal-comparative research, these kinds of questions may be investigated to find any cause-effect relationships between the variables of the study.

This study attempts to determine the effect of elementary school teachers' change styles on their technology use in the classroom. In order to achieve this goal, the study investigates if there is a difference between teachers' technology use based on their change styles, gender, and teaching experience. The independent variables of the study are the change style, gender, and teaching experience. The dependent variable is the technology use of teachers.

The following three instruments are used to collect data from the participating elementary school teachers in the School District in Florida. These three instruments are combined and hosted on Survey Monkey, an on-line survey website:

(1) The Background Questionnaire (Appendix C)

(2) The Change Style Indicator survey (Appendix A)

(3) The Teachers' Technology Use survey (Appendix B)

The researcher developed a short demographic questionnaire to collect demographic information based on the research questions and hypotheses. The questionnaire consists of four questions to determine the key background information of the participants. The Change Style Indicator is designed to measure an individual's

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preferences in understanding change and in dealing with situations involving change (Musselwhite, 1995). To measure elementary school teachers' technology use in the classrooms, the Teacher Technology Literacy instrument, developed by the Florida Department of Education (FLDOE) in 2004, is used. The purpose of this instrument is to measure teachers' performance indicators in technology use in the classrooms (Parshall, Harmes, Jones, & Rendina-Gobioff , 2004).

Definition of Terms

Change style: It is defined as an individual's preferences in understanding change and in dealing with situations involving change (Change Style Survey, Facilitator Guide, 1995). For the purpose of this study, the change style of a teacher is measured by a score on the Change Style Survey. Based on their scores, teachers will be placed in one of the three (originators, conservatists or pragmatists) style groups.

Technology use: Any use of educational technology for teaching and learning process in a classroom setting, ranging from rationalistic to constructivist applications (Blanch, unpublished doctoral thesis, Barry University, 2003). For the purpose of this study, Technology Use is measured by a score on the Technology Use survey.

Instructional technology: Computer and information technologies such as computers, devices that can be attached to computers (e.g., LCD projector, interactive whiteboard, digital camera), networks (e.g., Internet, local networks), and computer software. For the purpose of this study, non-computer technologies such as overhead projectors and VCRs are not included in this definition (NCSE, 2009).

Beginning teacher: A beginning teacher is defined as a teacher who has 3 or less years of teaching experience (these teachers are not eligible for a professional service or continuing contract).

Experienced teacher: An experienced teacher is defined as a teacher who has more than 3 years of teaching experience (these teachers are eligible for a professional service or continuing contract).

Limitations, Delimitations, and Assumptions

Limitations

The general limitations of the study were as follows:

1. Findings of this study may not be generalizable to other elementary school teachers.

2. There were other variables not included in this study, which may have effected the participants' technology use.

3. This sample group of the study is taken from a School District in Florida. The results of the study may not be generalizable for other school districts.

4. This study utilized the Technology Use Survey to determine teachers' instructional use of computer and information technologies in a classroom setting. If other surveys are used for the same purpose, the results may not be the same as the results of this study.

5. This study utilized the Change Style Indicator to determine the change style of the teachers. If other surveys or tools are used to determine the teachers' change styles, the results may not be the same as the results of this study.

6.   The school district from where the sample group was selected for this study

        may not be representative of other school districts in terms of professional

        support and training provided to teachers, availability of instructional

        technologies and administrative and technical support.

Despite these limitations, this study hopes to provide some useful insights into the

effect of change styles on instructional technology use by elementary school teachers in a

classroom setting. However, when drawing general conclusions about the effect of

change styles on instructional technology use of teachers based on the results of this

study, these limitations should be taken into consideration.

Assumptions

The general assumptions of the study are as follows:

1. It is assumed that all the participants completed the surveys honestly

2. It is assumed that the school principles in Broward County and Barry University's

    course instructors made the recruitment flyer available to all teachers in their

    schools/classes as instructed on the information forms

Chapter Summary

The introduction of the computer and information technologies into the

elementary school classrooms has been increasing rapidly during the recent years.

However, the increasing availability of these technologies in the classrooms does not

mean that they will produce more effective ways of teaching and learning by themselves.

These technologies have to be integrated into the curriculum in order to help students to

achieve higher academic standards and improve education in elementary schools.

Atkinson and Dias (2001) stated that the integration of these technologies into the

curricula with the purpose of improving teaching and learning in the classrooms has been in a state of evolution since their introduction into education. Despite the obvious benefits of these technologies to improve our education, some teachers and administrators still remain skeptical about using these technologies in the classrooms (Swanson, 2006). As Fullan (2007) suggests that these technologies have changed the way we learn and teach. They changed the school building and culture; they changed the role of teachers in the classrooms. It is not completely clear yet why some teachers embrace educational technology while some others resist using them for teaching and learning in the classrooms. Teachers' change style might be the key factor in understanding instructional technology integration in elementary school classrooms.

The constructivist learning theory establishes itself as the theoretical base of this study. From the constructivist learning theory perspective, this study investigates the effect of change styles on instructional technology use by elementary school teachers in a classroom setting.

The causal-comparative research approach is selected to test the hypotheses of the study. Since it is focused on the already existing conditions (change style of teachers and their instructional technology use), the causal-comparative approach is the most appropriate approach. According to Gay (1996), the causal-comparative research attempts to determine the reasons for the current status of the phenomena under study.

The following three instruments are used to collect data from the participating elementary school teachers in the School District in Florida. They are hosted on Survey Monkey, an on-line survey website: (1) The Background Questionnaire (Appendix C), (2) The Change Style Indicator survey (Appendix A), and (3) The Teachers' Technology

Use survey (Appendix B). The researcher developed a short demographic questionnaire to collect demographic information based on the research questions and hypotheses. The questionnaire consists of four questions to determine the key background information of the participants. The Change Style Indicator is designed to measure an individual's preferences in understanding change and in dealing with situations involving change (Musselwhite, 1995). To measure elementary school teachers' technology use in the classrooms, the Teacher Technology Literacy instrument, developed by the Florida Department of Education (FLDOE) in 2004, is used. The purpose of this instrument is to measure teachers' performance indicators in technology use in the classrooms (Parshall, Harmes, Jones, & Rendina-Gobioff , 2004).

CHAPTER II

REVIEW OF THE LITERATURE

Introduction

As we have just entered into the 21st century, technological dreams have been becoming a reality inspired by the advances in computer and information technologies. In 1964, Marshall McLuhan suggested that we lived in a global village where people from all around the world can interact with each other through the interactive communication technologies as if they are living in the same village. Marshall McLuhan's Global Village has become a reality today. The world became a global village connected with the advanced computer and information technologies such as the Internet and local and wide area networks. Today, people from all around the world are able to connect at the speed of on-line communication channels, share information, and talk face to face.

In today's classrooms, through computer and information technologies, students from all around the world can interact with each other. They can talk to each other as individuals, or as a group; they can chat on the web-based cameras as individuals or as a group; and they can share all sorts of data. Based on McLuhan's views, we can easily say that global classrooms are here today. Technological advances make it possible to transmit instructional materials to several sites regardless of geographic location in today's classrooms (AECT, 1993). Students in the classrooms in the USA can interact with the students at the other end of the world through some computer hardware and software combinations.

However, in order these technologies to create global classrooms, teachers should try to find ways to integrate these technologies into their teaching effectively and

efficiently (Schofield, 1995). Technology in itself can not change the current education system and it can only make a difference when successfully integrated into the curriculum (Muir-Herzig, 2004). Otto and Albion (2004) suggest that even though the new technologies are widely available in the classrooms, they are not fully integrated into the classroom teaching and learning activities. As Fullan suggests (2007) in order these technologies to be integrated successfully into the curriculum, we should investigate teachers' instructional use of technology in their classrooms. Also, we should analyze the change and change process at the classroom, particularly at the individual teacher level. Otherwise, these technologies may not be utilized in their quest to help teachers to change teaching and learning process in the classrooms. There is no question that the success of the effective and efficient integration of these technologies into the curriculum depends largely on the teachers. However, there is little known about how teachers have responded having these technologies in their classrooms and how often they use them. There are teachers who embrace technology and there are teachers who resist it. And, there are teachers who are skeptical about the technology, but they are willing to take calculated risks when it comes using them in the classrooms. What makes one teacher to embrace these technologies and use them more often than their colleagues? Why some teachers resist using them in their classrooms? It is critically important to investigate, analyze and understand how teachers in elementary schools respond to these technological changes in their classrooms. As educators, policymakers, administrators and business leaders, we should understand the effect of teachers' change styles on their instructional technology use in elementary schools. We should focus on our teachers in the classrooms since the instruction takes place there.

This chapter explains the philosophical framework of the study. Then it focuses on the technology and education; technology use and elementary school teachers; teachers and change; and, teachers, change and technology. Teachers' change styles, gender, and teaching experience on their instructional use of technology in the classroom are also discussed.

Philosophical Framework/Research Paradigm

Merriam-Webster's Collegiate Dictionary (2009) defines the word paradigm as "a philosophical and theoretical framework of a scientific school or discipline within which theories, laws, and generalizations and the experiments performed in support of them are formulated; an example or pattern: small, self-contained, simplified examples that we use to illustrate procedures, processes, and theoretical points" (p. 898). Patton (1990) defines paradigm as "a world view, a general perspective, a way of breaking down the complexity of the real world" (p.37). Guba (1990) defines paradigm as an interpretative framework, which is guided by "a set of beliefs and feelings about the world and how it should be understood and studied (Denzin & Lincoln, 2001, p.183).

Dill and Romiszowski (1997) stated that the basic functions of a paradigm to define how the world works, how knowledge is extracted from this world, and how one is to think, write, and talk about this knowledge; define the types of questions to be asked and the methodologies to be used in answering; decide what is published and what is not published; structure the world of the academic worker; provide its meaning and its significance.

Denzin and Lincoln (2005) stated that a research paradigm encompasses four terms: *ethics* (How will I be as a moral person in the world?); *epistemology* (How do I

know the world? What is the relationship between the inquirer and the known?); *ontology* raises the questions about the nature of the human being reality; *methodology* focuses on the methods how to acquire knowledge about the world. The answers to these questions explain the nature and the basic beliefs of a particular research paradigm. The constructivist paradigm assumes that there are multiple realities, the teacher and learner create concepts and understandings collaboratively, and the process takes place in the real world with some methodological procedures (Denzin & Lincoln, 2005). The users of constructivism, or constructivist paradigm, are "oriented to the production of reconstructed understandings of the social world" (Denzin & Lincoln, 2005, p.184).

Based on its overall beliefs and principles, the constructivist learning theory establishes itself as the theoretical base of this study. By definition, as an educational philosophy, constructivism places the focus of the learning process on the learners. It assumes that learners construct their own knowledge through their own experiences (McNair, 2005). The learners interpret what they experience through their senses and construct their own knowledge from those experiences. In this process, learning is considered successful only when the learner can demonstrate conceptual understanding of their experiences.

Although the roots of the constructivist learning theory may be found in Giambattista Vico's writing, an 18th century philosopher, Jean Piaget and John Dewey are seen the first major contemporary philosophers and educationalists to bring the fundamentals of this theory into the light (Thanasoulas, 2001). The learners construct their own concepts and find their own solutions to the problems, thus giving them the authority to learn from their own experiences. These experiences differ from learner to

learner since, as individuals, they differ from each other. The constructivist theorists argue that knowledge is not directly transmittable from one person to another, but rather it is constructed at the individual level (Matthews & Liu, 2005).

One of the major characteristics of the constructivist learning theory is that personal learning is an active process and it is not a matter of linearly acquiring and accumulating knowledge. Learning is a continuously ongoing process and every learner has his/her own individual ways of experiencing and keeping that knowledge (Davis, 2004).

Constructivist Theory and Computer and Information Technologies

The recent computer and information technologies have changed the teaching and learning process in the classrooms. The roles of the students and teachers have changed. According to Fullan (2007), the computer and information technologies have brought some fundamental changes into the classrooms. These technologies changed the roles of the teachers in a classroom; they changed the structure of the school buildings; and they changed teaching and learning process. Teachers, as the learners of these technologies, have to reconstruct their own beliefs of teaching and learning process with instructional use of educational technologies. They have to develop new skills and gain new knowledge in order to be effective and efficient in their classrooms. Teaching and learning in today's classrooms must focus on engaging students in activities to help them construct their own knowledge (Knapp & Glenn, 1996). Teachers should adapt to their new roles as facilitators more than being information providers. Learning is more effective when students actively manipulate and synthesize information in such a way

they it expands their own understandings of the real world around them (Knapp & Glenn, 1996).

The use of technology in the classroom supports the constructivist view of learning in which the teacher becomes the facilitator of learning rather than the source of knowledge (Silverstein, et al., 2000). From a constructivist perspective, students use technology to construct their own understanding of the real world and construct their own concepts and understandings. Technologies, as tools, assist them to construct and understand their own concepts and share that with others. Glenn and Knapp (1996) state that traditional instructional strategies are questioned today based on the research in cognitive psychology. They indicate that the learners develop their own understandings of the concepts based on their own observations and experiences. It is clear that the principles and beliefs of constructivism lay the foundation of this new learning style in the classrooms. In order to support this learning style, the role of the teachers should change. Teachers should facilitate their students' learning by engaging them in teaching-learning activities that encourage them to expand their own knowledge based on their own experiences. Teaching and learning activities must engage students to help them to construct their own understandings and concepts (Glenn & Knapp, 1996). Teachers should be facilitators more than lecturers in the classrooms. When teachers are able to create student-centered learning environments in their classrooms, the students are empowered to seek and manipulate information in collaborative, creative and engaging ways. The student-centered learning environments are usually problem and project centered, customized to learners' needs, communicative and encourages collaborative activities among students (CEO Forum, 2001).

This study analyzes the effect of the elementary school teachers' individual change styles to integrate computer and information technologies to support teaching and learning process from a constructivist approach. It analyzes a teacher's individual preference to adapt to the changing roles in the classroom. Also, this study analyzes how teachers' change styles effect their use of computer technologies to support constructivist approach's principles and beliefs of teaching and learning in a classroom environment.

Technology and Education

Educators have used computer and information technologies as teaching and learning tools for over three decades according to a report by the U.S. Department of Education (1996), *Getting America's students ready for the 21st century: Meeting the technology literacy challenge*. Another study conducted by the National Center for Education Statistics (2000), *Teachers' tools for the 21st century: A report on teachers' use of technology*, stated that the U.S. Department of Education described computers as the new basic tools of American education. Glennan and Melmed (1996) stated that recent computer and information technologies have the revolutionary force to reform our schools and they claim that a widespread reform without these technologies is probably impossible. Fullan (2007) also suggested that these technologies have the potential to change and reform the teaching-learning process in the classrooms.

Based on its potential to improve teaching and learning process in the classrooms, elementary schools around the nation have devoted considerable resources to technology during the last decades (Evans-Andris, 1996). The availability and use of computer and information technologies in the nation's elementary school classrooms have been increasing in recent years and this trend seems to be continued in the future. During

1990s, the United States has spent $38 billion to bring computer and information technologies in its elementary school classrooms (Benton Foundation, 2001). According to the research findings conducted by the University of California in 2001, the estimated total technology expenditures in 1998 for the elementary school system were about $7.2 billion. This amount is accounted for the 2.7 % of all education spending for the same year (Anderson, R. & Becker, H., 2001). In its recent report to the President on the use of technology to strengthen Elementary Education in the United States, the President's Committee of Advisors on Science and Technology (PCAST, 1997) reported that public elementary and secondary schools in the United States spent somewhere between $3.5 and $4 billion on computing and networking hardware, wiring and infrastructure enhancements, software and information resources, systems support, and technology-related professional development during the 1995-96 school year. The educational technology budget for the 2000-2001 school year was estimated at $5.8 billion (CEO Forum, 2001). This trend of increasing technology spending seems to have improved the nationwide student-computer ratio significantly. Only 18 percent of schools had an instructional computer in the entire nation in 1981; by 1994, this figure had risen to 98 percent (Mehlinger, 1995). In 1983, there was one computer for each 125 students in the public schools of America. By 1995, there was a computer for each nine students Glennan & Melmed, 1996). According to the National Center for Educational Statistics' Fall 2008 report, the ratio of instructional computer with the Internet connection to student is 3.1 to 1. Ninety-seven percent of schools had one or more instructional computers located in classrooms. Almost all public schools (%100) had one or more instructional computers with the Internet connection in classrooms (NCES, 2008).

While the availability of the computer and information technologies in the nation's classrooms has been going up, the questions regarding the use these technologies in elementary school classrooms have been surfaced, too. Educators have been realizing that technology itself is not a magic tool; it is not going to solve the problems we face today in our schools on its own. At the same time, it is clear that these problems may not be solved without the technology. Therefore, it may be acceptable to say that the discussion about having computer and information technologies in the classrooms should focus on the effective and efficient integration of these technologies into teaching curriculum based on the constructivist learning theory. As the CEO Forum (1999) indicated, the real strength of technology in education comes from using the right technology at the right time to meet the right objective. It has been argued that when used appropriately, computer and information technologies have the potential to help educators to solve some of our education problems in the classrooms (Gilbert & Drisco, 2001). These technologies can prepare students for the 21st century because they can extend learners' cognitive functioning and enable learners to build their own personal understandings interpretations (Jonassen, 1995). However, as citied in Hogarty and Kromrey (2000), the effectiveness of computer and information technologies in education remains inconclusive. Although, there has been an increasing interest in research concerning the technology use in schools, the current literature have not been sufficiently rigorous to support in the research findings related to the effectiveness of technology in educational settings (Hogarty&Kromrey, 2000).

Local and community business leaders, parents, and state and federal policymakers are all looking into schools' use of educational technology in order to

evaluate the effectiveness of these technologies to achieve educational objectives. According to the CEO Forum Report on the Educational Technology and Readiness (2001), the eight grade USA elementary schools students ranked 18th in science and 19th in mathematics among the 38 industrialized nations. The CEO Forum report indicates that there is a consensus among the community and business leaders, educators and parents that the traditional ways of teaching are not preparing the students for the 21st century. There is a strong need to integrate technology into classroom instruction to prepare students for the global market. According a report by the Alliance for Excellent Education (2008), the United States' high school students competitiveness in the global market is very poor compared with the developed nations' students belonged to the Organization for Economic Co-operation and Development (OECD). The same report indicates that in almost every international assessment of academic proficiency, American students ranks from mediocre to poor.

Despite the increasing number of computer and information technologies in schools, and despite their increasing use as instructional tools, there is a little known about how teachers respond to these technologies in their classrooms (Evans-Andris, 1996). For the success of computer and information technology implementation in schools, and to increase the quality of education in the classrooms, it is critical to investigate, analyze and understand teachers' use of these technologies in the classrooms, because, as Glennan and Melmed (1996) point it out, too, the successful use of educational technologies in a classroom depends on the teachers.

Technology Use and Elementary School Teachers

Technology use in classroom instruction is a challenging concept to define. The literature review about the definition of technology use, particularly computer use, reveals a wide range of definitions which involves frequency of use, amount of time used and purpose of use. In most cases, the technology use is defined as the frequency of use in classroom instruction. As citied in a survey conducted by Harvey-Morgan, Hopey and Rethemeyer (1996) about the technology use in adult literacy programs, Askov defines technology use in terms of frequency. Henderson (1994) explained the use of technology in terms of how frequently computer software and hardware is used for instruction. For the purpose of this study, the technology use is also defined as the frequency of use instructional technology in a classroom setting.

Majority of teaching and learning happens in the classroom in an elementary school setting. In a traditional classroom, the teachers direct teaching and learning process. Teacher is the source of information. With the help of recent computer and information technologies, this traditional way of teaching and learning process is being challenged by a reformist and constructivist approach. In this new approach, students are the center of instruction and the roles of teachers and students in the classrooms have been changed. Teachers become facilitators; and, students are on their own to explore and experience new concepts and share them with others (U.S. Department of Education, 1993). Table 1 below compares the traditional classroom instruction with the reformed classroom instruction.

Table 1

Comparison of Traditional and Reform Approaches to Instruction

TRADITIONAL INSTRUCTION	REFORM INSTRUCTION
Teacher directed	Student exploration
Didactic teaching	Interactive modes of instruction
Short blocks of instruction on single subject	Extended blocks of authentic and multidisciplinary work
Individual work	Collaborative work
Teacher as knowledge dispenser	Teacher as facilitator
Ability groupings	Heterogeneous groupings
Assessment of fact knowledge and discrete skills	Performance based assessment

Source: Using Technology to Support Education Reform, Association for Educational
Communications and Technology, US. Department of Education, 1993.

Computer and information technologies facilitate teachers to create a student-centered teaching and learning environment where teacher becomes a facilitator and provides guidance for the students. Table 1 illustrates that classroom instruction is based on challenging and collaborative tasks. These tasks help students to gain experience to work with others and communicate their ideas and concepts by using different technological tools. Multidisciplinary tasks (i.e. using text, graphics, moving and still

images, together to present a concept) challenge students to use their combined skills to explain their concepts to others. This in return, may require longer class periods, instead of traditional 50-minute periods. When students are working in this kind of learning environments, they become more involved in their own learning and explore and experience the concepts on their own. Teachers become facilitators rather than knowledge sources in the classroom (Fullan, 2007).

Business, government and education leaders are concerned that today's students are not prepared to compete in the global marketplace (Partnership for 21st Century Skills, 2005). One of the major concerns of business leaders is that the widening gap between the knowledge and skills students are learning in schools and the knowledge and skills they need to be successful in the technology based global marketplace. In order to eliminate this gap, the Department of Education (2001) required students to be technologically literate by the time they finish the eight grades. The teachers would be the responsible for this gap to disappear. For the success of computer and information technology implementation in schools, and to increase the quality of education in the classrooms, it is critical to investigate, analyze and understand teachers' use of these technologies in the classrooms, because, as Glennan and Melmed (1996) point it out, too, the successful use of educational technologies in a classroom depends on the teachers.

Teachers and Change

In the Merriam-Webster's Collegiate Dictionary (2009), change is defined as "to give a different position, course, or direction to; to undergo a modification of" (p.206). Change requires people to leave their current positions in order to gain a new position, or to modify their current position so that a new direction surfaces. Fullan (2007) describes

change as a process of moving from an unsuccessful way of managing change to a new mind-set. He suggests that while the initiatives for change may be forced upon schools from external sources such as federal and state officials, local and national business leaders, the real change must be internal, within the school system. Change is a constant issue in education and as Fullan indicates, the demand for change may come from all sides. Because it is such a critical issue in education, this section of the study focuses on the change, change factors and conditions, change process and elementary school teachers' change styles.

Change Factors and Conditions

According to Fullan (2007), the computer and information technologies have changed the role of teacher in a classroom; they changed structure of the school buildings; they changed teaching and learning; and they changed many other faces of education. Furthermore, Fullan states that the recent educational and information technologies have opened new horizons for education. They created a vision for equal opportunity and individualized education for everyone. They changed the role of teacher in a classroom; they changed structure of the school buildings; and they changed teaching and learning. However, Fullan suggests that the real change must be analyzed at the school, and particularly, at the individual teacher level in the classroom.

As Hodas (1993) stated the diffusion of technology into a classroom changes the classroom culture and forces teachers to accept the values of these technologies. Teachers should find their own reasons to integrate these technologies into their teaching practices or just refuse the integration process. If there is a lack of use and understanding of these technologies to be integrated into classroom instruction, then teachers must not see the

need for change (Hodas, 1993). Therefore we should analyze and understand the change at the individual teacher level. The change style of a teacher is at the root of successful integration of computer and information technologies into classroom instruction.

Elementary schools around the nation are often criticized for their utilization of recent computer and information technologies to improve quality of education in the classrooms (AECT, 1993). These criticisms are coming from the comparisons of school and business use of these technologies. When looking at the business workplace, it seems that these technologies have transformed the workplace and increased workers' productivity (AECT, 1993). The question becomes why schools continuously fall behind reforming the classrooms with these technologies.

The important thing about change is to understand how individuals handle the reality of the change itself (Fullan, 2007). In recent decades, computer and information technologies have been trying to change our education system since the early 1980s. As Goodman (1995) suggested, a new wave of change is needed to accommodate computer and information technologies for the information age. Goodman mentioned that our school system was designed for the industrial age and now it is time to redesign it for the information age. Fullan supports Goodman's idea by pointing out that recent computer and information technologies have changed the structure of the schools and classrooms, as well as the way teachers teach and students learn (Fullan, 2007). In Fullan's perspective, these technologies created a vision of equal opportunity and individualized education for everyone. They changed many faces of education: they changed the role of teachers in the classrooms, they changed the role of the students, they changed teaching and learning, and they changed school buildings (Fullan, 2007). Mehlinger (1995) agreed

with Fullan on the changes the recent computer and information technologies brought

into the school system and classrooms. As these technologies moves to the center of

education, they challenge the nature of schooling (Mehlinger, 1995). They create a type

of learner and they change the roles in the classroom.

In his book, *the New meaning of educational change* (4th edition*)*, Fullan (2007)

listed eight factors, which have an effect on change process in the classrooms. These

factors are (p. 70):

1. Existence and quality of innovations

2. Access to innovation

3. Advocacy from central administration

4. Teacher advocacy

5. External change agents

6. Community pressure/support/apathy

7. New policy –funds (federal, state, local)

8. Problem-solving and bureaucratic orientations

Even though there may some other factors that have an effect on change and

change process in the classroom, these eight factors of change are derived from the recent

literature and they are not in any specific order (Fullan, 2007). The change can be

initiated by any one of these factors alone or a combination of them together. It does not

matter whom or what source initiates the change, but its success largely depends on

teachers in the classrooms. When conditions are met with teachers' need for change, they

will initiate and implement the change at the individual classroom level. "Educational

change depends on what teachers do and think-it's as simple and as complex as that" says

Fullan (2007, p.129). From this perspective, it is safe to state that teachers are the most

critical factors in the change process. It may be safe to say that the instructional

technology use frequency in a classroom setting largely depends on how teachers respond

to change and change process, and how they deal with situations involving change. In

other words, it depends on the change styles of teachers.

Change Process

Rogers' (2003) theory on the diffusion of innovations refers to change processes

in relation to the individual and his or her decision process regarding the adoption or

rejection of an innovation or change. There are five steps in the decision process:

1. Knowledge: Knowledge occurs when an individual is exposed to change or an
   innovation's existence and understands how it functions

2. Persuasion: It occurs when an individual forms an opinion (favorable or
   unfavorable) and adapts his/her attitude towards the innovation/change.

3. Decision: takes place when an individual decides to engage in activities that lead
   to a choice to adopt or reject the change

4. Implementation: It occurs when an individual decides to put the innovation or
   change into use for his/her practice.

5. Confirmation: In the confirmation process, the individual seeks reinforcement of
   an innovation-decision already made, but he or she may reverse this previous
   decision if exposed to conflicting messages about the innovation.

The Technology Integration Matrix (TIM) also has five steps to adopt technology

into classroom teaching. It is developed by the Florida Center for Instructional

Technology at the College of Education, University of South Florida in 2007. The TIM

also provides teachers some models of integrating technology into their daily teaching activities. Based on the nature of the learning environment, the TIM provides a process of adapting to technology integration for teachers. According to the TIM, the five stages are as follows: entry level, adoption level, adaptation level, infusion level and transformation level.

1. Entry level: At this level, teachers use technology to deliver teaching content to students in the classroom. Technology is used to support teacher-directed instruction.

2. Adoption level: At this level, teacher allows students conventional use of available technology such as word processing or e-mail programs.

3. Adaptation level: Teachers allow students to select their own technological tools to complete a classroom task. Students are able to select a technology tool, use it to complete their task and present their ideas.

4. Infusion level: At this level, teacher is comfortable teaching with technology and encourages students to select a technology tool, customize it to their subjects to construct new understandings and concepts. Students are capable of using multimedia tools to understand and deliver their subjects.

5. Transformation level: A student-centered teaching and learning environment is successfully created and implemented on a daily base at this level. Students sue technology on a daily base to construct, share and publish knowledge to a larger audience.

In both models of technology integration and change process, teachers'
understanding of change process is seen as a critical process for the successful integration
of technology into the classroom teaching. For most teachers, and people in general,
change process can be a challenging one. The growth process from being an entry-level
teacher to the transformation-level requires teachers to examine their beliefs, assumptions
and values. Without a clear understanding of their own change styles and individual
approach to change and situations involving change, elementary school teachers may be
challenged about how and at what frequency to use instructional technology to attain
their teaching objectives successfully.

Change Styles

There are many different types of change styles and different approaches to
managing these change styles. Rogers' (2003) theory on the diffusion of innovations
refers to change processes in relation to the individual and his or her decision process
regarding the adoption or rejection of an innovation or change. He suggests that the level
of openness to change identifies an individual's response to change. Based on his
research, Rogers categorizes people into five main groups based on their change styles:
Innovators, Early Adopters, Early Majority, Late Majority, and Laggards or Resisters.

1. Innovators: Rogers says the innovators are the brave people who initiate the
change. They are risk takers, daring and experimental individuals. They have the ability
to understand and apply complex technical concepts while able to cope with a high
degree of uncertainty. Innovators serve their community as the gatekeepers to the flow of
new ideas. Elementary school teachers who have been teaching with computer and

information technologies in their classrooms in innovative ways before their peers can be placed in this category.

2. Early Adopters: Early Adopters are respectful people, opinion leaders; try out new ideas in a calculated way. The people in this group tend to be more connected with their local community and peers. They are highly influential in developing similar opinions amongst their colleagues. They serve as a role model for their friends and colleagues since they are well respected by their peers. Early adopters are the most influential group because others respect their opinions about new innovations. This is the group most often targeted as change leaders.

3. The Early Majority: The early majority group of people are thoughtful, careful but accepting the change quicker than the average individuals. They take their time to understand the change and adopting new ideas. They do not initiate change, but will express their willingness to change and accept the change.

4. The Late Majority: The Late Majority people are skeptic people. They do not adopt change until most others in their system have done so because they require the pressure of peers for motivation. They do not like uncertainty and must feel safe to make a change. The teachers in this group may be beginning to employ technology for personal reasons. They may use the computer lab for their designated period but probably haven't yet understood the new constructive ways of using technology. They use technology as a part of their traditional teacher-centered information delivery methods. Activities are probably still teacher directed because the use of technology is not yet being built into the process of teaching process. While they may have agreed to use computers in their classrooms, they still employ traditional ways and use technology only to pass the time.

5. The Resisters: The resisters are traditional people, caring for the old ways, are critical of new ideas, and will only accept change and new innovations only if they become mainstream or even tradition. They are suspicious of change and change leaders round them. These individuals see themselves as having limited resources and they must be sure that a new idea will not fail before they can start using it. The teachers in this group will continue to postpone integrating computer and information technologies into their teaching. They produce reasons for not accepting the change in their minds. Not having enough computers, or not having enough time and materials are some of the reasons they may defend themselves against fully integrating technology into their classroom teaching.

Rogers' work suggested that early adopters are the most influential agents for change because they have links to both the innovators and the more conservative groups. These people are the change agents or change leaders in a school system. A study conducted by Becker and Riel (2000) at the University of California supported the same idea. Becker and Riel have divided teachers into two main categories based on their technology use: private practice teachers and teacher leaders. They reported that private practice teachers are less concerned about integrating technology and shifting to a student-centered teaching philosophy than the teacher leaders. The private teachers have a higher percentage of traditional ways of knowledge transmission than the professional teachers. For the teacher professionals, teaching and learning with technology is a constructive process. They use technology to create student-centered classrooms in which students work collaboratively in projects, share and evaluate their own work within the

classroom, generate their own ideas. They share their experiences with their peers, thus creating a student-centered classroom environment by leading the way.

The Change Style Indicator, which is used for this study to determine the change styles of elementary school teachers has three main groups of people: Originators, conservatists and pragmatists. Based on the results of this instrument, an individual is placed on a continuum ranging from a conserver orientation to an originator orientation. A pragmatist orientation is placed at the center of the change style continuum. The closer to one end of this continuum, the stronger is the preference for a conserver or originator approach to change. Conservers prefer to preserve the existing paradigm or system. They prefer gradual and incremental change in their environment. Originators prefer to challenge the existing paradigm or system. They take a faster and more radical approach to change, thus resulting in fundamentally different, sometimes systemic changes. The pragmatists, on the other hand prefer change that is functional. They are interested what will work better in a given situation. Pragmatists prefer to question and explore the current paradigm in an open and objective manner. It should be pointed out here that the Change Style Indicator measures an individual preference, not effectiveness or skill at utilizing a preferred change style. Later in this chapter, more information is provided about the characteristics of these three change style groups.

<div align="center">**Teachers, Change and Technology**</div>

Technological Change in the Elementary School Classrooms

Computer and information technologies have the potential to change how people gather, analyze, present and share information (See, 1994). The effect of recent technological developments is one of the most discussed issues in education (Webber,

<div align="center">44</div>

2003). The effective and efficient use of these technologies can transform teaching and

learning process in the classrooms (Volman, Van Eck, 2001). Thus creating learning and

teaching environments where students work collaboratively; they share ideas with others;

they create their own experiences and understandings. In recent decades, these

technologies are seen by the educators as powerful instruments to support new ways of

teaching and learning. As Drent and Meelissen (2007) suggested computer and

information technologies should be used to achieve teaching objectives by teachers to

teach their students skills for searching and assessing information, cooperation,

interaction and problem solving. If teachers can successfully implement what Drent and

Melissen suggested, those teachers' students would be ready for the knowledge society.

For this reason, every classroom teacher should integrate these technologies into their

teaching curriculum, because their students can engage in critical thinking, decision-

making, problem solving, cooperating and sharing ideas.

Teachers and Technology Use in the Classrooms

In order for the computer and information technologies to facilitate student-

centered teaching and learning in the classrooms, there should be a shift in the learning

and teaching paradigm (Bangkok, 2004). Teachers play a critical and important part in

this process. As citied in Kozma (2003), Bransford, Brown and Cocking suggest that the

success of integrating computer and information technologies into classroom teaching

much depends on how the teachers adapt to these technologies. Indeed, without teachers'

understanding of the potential of these technologies, the efforts to reform our education

system may not be possible. Teachers should be affective change agents to be able to

make use of these technologies in today's classrooms (Bangkok, 2004). There is no doubt

that teachers are the center of curriculum change and they are in control to change the learning and teaching paradigm in the classrooms. In order for their students to be ready for the 21st century's knowledge society, teachers may need to review and adept their classroom teaching practices based on their change styles.

Teaching experience of teachers and technology use.

According to a report by the National Center for Education Statistics (2000) teachers with fewer years of experience in teaching were more likely to use computer and information technologies in their classrooms than the teachers with more years of teaching experience. The report indicated that teachers with 20 years or more teaching experience used computers only 33% of the time while teachers with three years or less teaching experience used them 48% of the time in their classes. Teachers with 4 to nine years of experience used computers 45% of the time while teachers with 10 to 19 years of experience used them for 47% of the time. Based on this report, teachers with less experience in teaching use computer and information technologies more often than the other, more experienced teachers in their classes. This may be due to the fact that new teachers have been exposed to these technologies during their university education more than their previous generations.

Teachers' gender and technology use.

For all their similarities, female and male elementary school teachers may view technology differently. The literature review on the instructional use of educational computing by gender suggested conflicting findings (Teo, 2002). While the differences do not appear to be as great as some stereotypes might suggest, they offer insights that will be useful as we consider technology and education (Rose, 2004). Polled men and

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women indicate equally that technology should be part of the school's curriculum. However, polls indicate that men are somewhat more informed than women about the way technologies work. The majority of men and women feel that technological literacy should be integrated into other subjects. Men and women are in general agreement on the importance of being able to understand and use technology (Rose, 2004).

For example, Hong (2002) studied two hundred secondary school teachers, of whom more than half did not have any formal training in computers. He found no significant differences between male and female teachers in overall computer anxiety levels. However, for the domain of hardware anxiety, female teachers had significantly higher levels than male teachers. There were no differences between male and female teachers in overall attitudes toward computers (Hong, 2002).

Teo (2002) have shown more striking differences between men and women in their views toward technology. Examples of studies of undergraduate business majors have found that males are better at computing, have more positive attitudes, and experienced lower anxiety.

Yuen and Ma (2002), who studied one hundred and eighty-six pre-service teachers at the University of Hong Kong, have shown that perceived ease of use is not significant towards intention to computer use for males. On the contrary, perceived ease of use contributes significantly higher to the intention of computer use in females. Furthermore, Venkatesh (2000) found that in his study of three-hundred-forty-two non-teacher workers, men appear highly motivated by productivity-related factors such as usefulness.

When compared to personal productivity use and functions, and more specifically to word processing, gender was found to be a significant factor. Female faculty members were more likely to use word processing applications than their male counterparts (Benson, 1999). In addition, Spotts, Bowman & Mertz (1997) found that male faculty self-rated their knowledge and expertise higher in some technologies than did women, but did not find a difference in the frequency of use.

A study conducted by Venkatesh and Morris (2003) about the gender and use of technology showed that men were strongly influenced by their attitude toward using the new technology; women, on the other hand, were influenced by their subjective norm and perceived behavioral control. Another study conducted by Bowmen, Mertz and Spotts (1997) about the gender and use of instructional technologies reports that some gender based differences can be found in the level of knowledge and expertise, particularly for computer related technologies. According to their study, males are more knowledgeable and have more experience in innovative uses of computer technologies while females use these technologies more frequently than their male counterparts. However, when it comes to teaching with technology in the classroom, there were not any significant differences between males and females.

Teachers' change styles and technology use.

As computer and information technologies have changed and expanded into the classrooms during the last decades, teaching and learning processes involving technology has also changed (Evans-Andris, 1996). As newer interactive technologies enter the education system, they bring new ways of teaching and modify the current classroom teaching strategies (Weber, 1992). Despite this expansion of technology to almost every

aspect of classroom teaching, little is known about the ways teachers have responded to this change. Some studies report that some teachers apply these technologies into teaching for only drill and practice routines; and some other studies report that some teachers are integrate these technologies to create a new classroom setting based on student-centered and collaborative teaching and learning activities (Evans-Andris, 1996). As Weber indicated (1992), when interactive media, such as computer and information systems, enter into a classroom, people's characteristics should be carefully considered if their effectiveness for instruction and learning is to be maximized. As an aspect of personality, change style of a teacher is an important factor in using computer and information technologies in the classroom. Personal characteristics of teachers, such as their change styles, are important factors to determine how they handle a new technology around them (Afsari, Bakar, et al, 2009). If a teacher is a creative and decision-maker, he or she may be more likely to use technology to create a student-centered learning environment in the classroom instead of a traditional classroom practices. A study conducted by Becker and Riel (2000) at the University of California supports the same idea. Becker and Riel have divided teachers into two main categories based on their technology use: private practice teachers and teacher leaders. They report that private practice teachers are less concerned about integrating technology and shifting to a student-centered teaching philosophy than the teacher leaders. The private teachers have a higher percentage of traditional ways of knowledge transmission than the professional teachers. The teacher professionals vies teaching and learning with technology as a constructive process. They use technology to create student-centered classrooms in which

students work collaboratively in projects, share and evaluate their own work within the classroom, generate their own ideas.

Evans-Andris (1996) reports three styles of computing among elementary school teachers: style of avoidance, integration style and technical specialization style.

1. Avoidance Style: Teachers in this category are the ones who distance themselves from any technology use in the classroom. They provide their students access to computers, but they do not use these computers themselves to teach in the classroom. Students are engaged in routine ways of using computers, lacking creativity and constructive ways of using them. When these teachers attempt to teach with technology, they teach students how to operate machines. They are more comfortable teaching with their comfortable traditional teacher-directed approaches in the classrooms.

2. Integration Style: The teachers with the integration style embrace technology and they use computers as teaching tools in their classrooms. They engage in learning and mastering technology for the purpose of effective and efficient ways of integrating these technologies into their teaching activities. The assist and require their students to use computers to create multimedia presentations, collaborative projects and sharing their knowledge with a larger audience outside of the classroom through the Internet. These teachers are ambitious to create a student-centered teaching and learning environment in the classroom.

3. Technical Specialization Style: Teachers in this group are highly specialized in technical aspects of technology. They are also highly motivated to integrate technology into their classroom teaching activities. What separates this group from the previous other two groups is that they posses knowledge and skills about the technology itself more than

the other groups. These teachers sometimes spend more time teaching computers than teaching with computers. They devote much of their time promoting technical aspects of computers and spend less time on effective and efficient integration approaches of these technologies into their teaching activities.

The change style is defined as an individual's preferences in understanding change and in dealing with situations involving change (Musselwhite, 1995). The Change Style Indicator (CSI) is an assessment and measurement tool developed by the American W. Christopher Musselwhite in 1995. With the help of this instrument people's preferred way of dealing with change can be measured and evaluated. The score they receive from this instrument places them on a continuum of change styles, ranging from a conserver style to an originator style. A third style, the pragmatist occupies the middle range of the continuum.

The Change Style Indicator (Appendix A), which is used for this study to determine the change styles of elementary school teachers has three main groups of people: Originators, conservatists and pragmatists. The closer to one end of this continuum, the stronger is the preference for a conserver or originator approach to change. Conservers prefer to preserve the existing paradigm or system. They prefer gradual and incremental change in their environment. Originators prefer to challenge the existing paradigm or system. They take a faster and more radical approach to change, thus resulting in fundamentally different, sometimes systemic changes. The pragmatists, on the other hand prefer change that is functional. They are interested what will work better in a given situation. Pragmatists prefer to question and explore the current paradigm in an open and objective manner. It should be pointed out here that the Change

Style Indicator measures an individual preference, not effectiveness or skill at utilizing a preferred change style. Table 2 below summarizes the basic characteristics of each change style.

Table 2

Characteristics of Change Style Groups

CONSERVER	PRAGMATIST	ORIGINATOR
Accept existing structures	Explore existing structures	Challenge existing structures
Prefer step-by-step changes	Prefer change that is functional	Prefer extensive change
Focus on relationships	Focus on common goals	Focus on the task
Take care of the completion of projects	Take care of the implementation of plans	Initiate new ideas and projects

Source: The Change Style Indicator: Facilitator's Guide, 1995.

Conservers may appear more disciplined, precise, methodical, and cautious than the other groups. They solve problems while maintaining the integrity of the current paradigm and prefer solutions that are tested and proven. They accept conventional assumptions, enjoy predictability, and improve efficiency while maximizing continuity and stability. They may confuse the means with the end.

Originators, on the other hand, may appear more undisciplined, unorganized, abstract, and spontaneous than the other groups. They solve problems in ways that challenge the current paradigms, and always enjoy taking risks. They prefer quick and expansive change while challenging accepted assumptions. They serve as catalyst to established groups, and focus on individual contributions. Originators may appear as

visionary and systemic in their thinking, and may treat accepted policies/procedures with little regard.

Pragmatists may appear more practical, agreeable, and flexible than the other groups. They solve problems in ways that emphasize workable outcomes, and see both sides of an argument. This feature makes this group of people suitable to serve as mediators and bridges. They take more of a middle-of-the-road approach and explore accepted assumptions when conditions are appropriate. Pragmatists are result oriented people and more focused on results than the structure/organization of a situation.

This study utilizes the Change Style Indicator (CSI) as an assessment and measurement tool to measure elementary school teachers' preferred way of dealing with change in a classroom setting. This CSI is appropriate for this study based on its validity and reliability to measure a person's change style in approaching change and dealing with situations involving change. Its simple and accurate measurement of subjects' change styles separates it from other measurement tools in this field. By utilizing the CSI, the researches hopes to find answers to the following questions:

1. Why do some elementary school teachers appear so threatened by change and intent upon preserving the status quo?

2. *Why do some elementary school teachers appear constantly dissatisfied with the status quo and ready to challenge the existing paradigm?*

3. Why are some elementary school teachers reluctant to take small calculated risks while others seem so eager to take dangerous, unexplored risks?

4. Why are some elementary school teachers able to balance all perspectives and see both sides of an issue while others cannot?

5. Why do some elementary school teachers respond so effectively to gradual incremental change while others seem always oriented toward radical, systemic change?

6. Why do some elementary school teachers appear stuck and unable to take a position in a change situation?

This study focuses on the effect of elementary school teachers' change styles on their instructional use of technology in a classroom setting. On a broader perspective, the question becomes why some elementary school teachers embrace technologies while others resist such a paradigm. Also, why some teachers are skeptical about using technology, but willing to change their teaching methods if they see that technology is effective.

As the availability and use of computer and information technologies have grown in elementary schools' classrooms, so has interest in the extent and purpose for which these technologies are being used and how effectively and efficiently they are being used. The literature regarding the infusion of technology in the schools is extensive and continues to emerge. Researchers have conducted studies on a variety of educational technologies in vastly different environments and settings on different subject areas. Yet, despite the profusion of interest and inquiry, the research related to the effect of elementary school teachers' preferred approach to deal with teaching technology in the classrooms is limited. Particularly, the research about the effect of elementary school teachers' change styles on their instructional use of these technologies is almost nonexistent. The related literature review exposes that there is little data on this subject. The research to determine the effect of elementary school teachers' change styles on their

instructional use of technology in the classrooms is needed. This study may provide some

much needed research data in this filed. It is the hope of the researcher of this study that

in the future there will be more research studies on this filed to investigate, analyze and

understand the effect of teachers' change styles on their use of instructional technology in

the classroom. As Fullan (2007) indicates, the real change must start at the individual

teacher level in the classroom for the effective and efficient utilization of computer and

information technologies.

Chapter Summary

Marshall McLuhan's Global Village has become a reality today through the

advances in computer and information technologies in recent decades. The world became

a global village connected with the advanced computer and information technologies

such as the Internet and local and wide area networks. Not only the global village has

become a reality, but also the global classroom. Computer and information technologies

make it possible to transmit instructional materials to several sites regardless of

geographic location in today's classrooms. These recent technologies, however, can not

change the current education system on their own and they can only make a difference

when successfully integrated into the curriculum (Muir-Herzig, 2004). Otto and Albion

(2004) suggested that even though the new technologies are widely available in the

classrooms, they are not fully integrated into the classroom teaching and learning

activities. In order these technologies to be integrated successfully into the curriculum,

teachers' instructional technology use in classrooms should be investigated. Also, we

should analyze the change and change process at the classroom, particularly at the

individual teacher level, as Fullan (2007) suggested.

The use of technology in the classroom supports the constructivist view of learning in which the teacher becomes the facilitator of learning rather than the source of knowledge (Silverstein, et al., 2000). Therefore, the constructivist learning theory establishes itself as the theoretical base of this study.

Despite the increasing number of computer and information technologies in schools, and despite their increasing use as instructional tools, there is a little known about how teachers respond to these technologies in their classrooms. For the success of computer and information technology implementation in schools, and to increase the quality of education in the classrooms, it is critical to investigate, analyze and understand teachers' use of these technologies in the classrooms, because, as Glennan and Melmed (1996) point it out, too, the successful use of educational technologies in a classroom depends on the teachers. In order for the computer and information technologies to facilitate student-centered teaching and learning in the classrooms, there should be a shift in the learning and teaching paradigm (Bangkok, 2004). Teachers play a critical and important part in this process. As citied in Kozma (2003), Bransford, Brown and Cocking suggest that the success of integrating computer and information technologies into classroom teaching much depends on how the teachers adapt to these technologies. The effective and efficient use of these technologies can transform teaching and learning process in the classrooms (Volman, Van Eck, et al, 2001).

Personal characteristics of teachers, such as their change styles, are important factors to determine how they handle the recent computer and information technologies in the classrooms (Afsari, Bakar, et al, 2009). The change style is defined as an individual's preferences in understanding change and in dealing with situations involving

change (Musselwhite, 1995). The Change Style Indicator (CSI) is an assessment and measurement tool developed by the American W. Christopher Musselwhite in 1995. With the help of this instrument people's preferred way of dealing with change can be measured and evaluated. The score they receive from this instrument places them on a continuum of change styles ranging from a conserver style to an originator style. A third style, the pragmatist occupies the middle range of the continuum. The Change Style Indicator is used for this study to determine the change styles of elementary school teachers to measure the effect of these change styles on their instructional use of technology in the classroom.

This study focuses on the effect of change styles on the instructional technology use by elementary school teachers in a classroom setting. On a broader perspective, the question becomes why some elementary school teachers embrace instructional technologies and use them more often than some of their colleagues; and, why some teachers resist using them in their classrooms.

CHAPTER III

METHODOLOGY

Introduction

This chapter describes the overall methodology that is employed by this study. It describes the research design and the rationale for the research approach, the research paradigm, participants, research instruments, data collection procedures and role of the researcher. The validity and reliability of the survey instruments and their characteristics are discussed. Also, the ethical aspects of the study and validity of the data interpretation are explained. The overreaching purpose of this study is to investigate, analyze and understand the effect of change styles on instructional technology use by elementary school teachers in a classroom setting. Post-positivism is described as the philosophical framework of the study. The causal comparative research method is used to test the hypotheses and research questions.

Philosophical Framework/Research Paradigm

Patton defined paradigm as "a world view, a general perspective, a way of breaking down the complexity of the real world" (1990, p.37). As cited in Denzin and Lincoln (2001), Guba (1990) defined paradigm as an interpretative framework. It helps individuals to understand and study the world through a set of beliefs and feelings.

Denzin and Lincoln (2005) stated that a research paradigm encompasses four terms: *ethics* (How will I be as a moral person in the world?); *epistemology* (How do I know the world? What is the relationship between the inquirer and the known?); *ontology* raises the questions about the nature of the human being reality; *methodology* focuses on the methods how to acquire knowledge about the world. The answers to these questions

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explain the nature and the basic beliefs of a particular research paradigm. The researcher acts and sees the world within a selected paradigm. As Denzin and Lincoln stated, there are several paradigms for different kinds of research methodologies to conduct an inquiry in order to understand the world around us. According to them, all research is interpretative and "interpretative paradigm makes particular demands on the researcher" (Denzin & Lincoln, 1998, p.26).

As citied in Yu (2001), Feldman (1998) stated that quantitative research has been labeled as positivist or it is covered within a positivist frame of reference. Positivism has been perceived as the paradigm of the quantitative research for over a century. As citied in Kim (2003), the positivistic paradigm of research originated in the 19th century as an attempt to apply the methods of the natural sciences to social phenomena (Smith, 1983). French philosopher Auguste Comte is seen as the creator of the positivism, which has been a dominant mode of inquiry in social science for over a century. Since Comte's use of positivism in the 19th century, there has been major progress in social and educational research at universities and research institutions with the refinement of methodology and statistical analyses (Kim, 2003). The main principles of positivism are as follows:

1. The physical world and social events are analogous in that researchers can study social phenomena as they do physical phenomena,

2. Theory is universal and sets of principles and inferences can describe human behavior and phenomena across individuals and settings,

3. In examining social events, researchers adhere to subject-object dualism in that they stand apart from their research subjects and treat them as having an independent existence,

4. There is a need to formalize knowledge using theories and variables that are operationally distinct from each other and defined accordingly, and

5. Hypotheses about principles of theories are tested by the quantification of observations and by the use of statistical analyses.

Post-positivist and positivist paradigms "reflect a deterministic philosophy in which causes probably determine effects or outcomes" (Creswell, 2003, p.7). Both paradigms assume that the social world can be studied in the same way as the natural world, and that there is a method for studying the social world that is value free, and that explanations of a causal nature can be provided (Mackenzie & Knipe, 2006). According to O'Leary (2004), post-positivism aligns itself with the constructivist paradigm in some sense. He claims that post-positivists see the world as variable and multiple in its realities. Based on O'Leary's post-positivist view, there are multiple realities and an individual's reality may be different than the other individual. In other words, according to O'Leary, what might be the truth for one person or cultural group may not be the truth for another (as citied in Mackenzie & Knipe, 2006).

Post-positivism aims to explain the phenomena being investigated, ultimately enabling the researcher to make predictions (Denzin & Lincoln, 1998). Through post-positivist approach, the knowledge is gained by a process of knowledge accumulation, with each piece of knowledge acting as a building block in the process. When the facts come together, it enables the researcher to explain cause-effect linkages more effectively (Denzin & Lincoln, 1998). Post-positivists assume that accumulation of knowledge leads to generalizations to a population with predictable confidence. In a post-positivist

tradition, the inquiry is evaluated based on the following criteria (Denzin & Lincoln, 1998):

- internal validity (measured to the extent to which a researcher's measurements are true descriptions of a particular reality),
- external validity (the degree of generalizability),
- objectivity (researcher as distanced and neutral observer).

Post-positivist paradigm relies upon experimental, quasi-experimental (causal-comparative), survey and rigorously designed qualitative methodologies. As Creswell (2007) points out, post-positivism approach carries the elements of being reductionistic and cause-effect oriented. A post-positivist researcher relies on multiple perspectives instead of a single reality.

The researcher accepts the positivist and post-positivist paradigms as the guiding paradigms for this study. In the researcher's philosophical assumption, reliable and valid knowledge and meaning construction happens through scientific methods of inquiry. Individuals construct their own understandings and meanings of the real world based on their own experiences and feelings. They keep constructing new knowledge and meanings based on their previously validated and reliable knowledge and experiences. These experiences and feelings may come through the independent and collaborative learning with the other individuals. Through the collaboration and cooperation, individuals share their knowledge with other individuals and try to find consensus about the multiple realities of the world around them.

Research Questions and Hypotheses

Research Questions

The purpose of this study is to investigate the effect of change styles on instructional technology use by elementary school teachers in a classroom setting. The research questions of this study are:

$R$1:   Is there a difference in technology use based on change styles of elementary school teachers?

$R$2:   Is there a difference in technology use based on change styles of female elementary school teachers?

$R$3:   Is there a difference in technology use based on change styles of male elementary school teachers?

$R$4:   Is there a difference in technology use based on change styles of beginning elementary school teachers?

$R$5:   Is there a difference in technology use based on change styles of experienced elementary school teachers?

Null Hypotheses

The null hypotheses of the study are:

$H_0$1:   There is no difference in technology use based on change styles of elementary school teachers

$H_0$2:   There is no difference in technology use based on change styles of female elementary school teachers

$H_0$3:   There is no difference in technology use based on change styles of male elementary school teachers

$H_0 4$:   There is no difference in technology use based on change styles of

beginning elementary school teachers

$H_0 5$:   There is no difference in technology use based on change styles of

experienced elementary school teachers

Research Hypotheses

The research hypotheses of the study are:

$H_A 1$:   There is a difference in technology use based on change styles of

elementary school teachers

$H_A 2$:   There is a difference in technology use based on change styles of female

elementary school teachers

$H_A 3$:   There is a difference in technology use based on change styles of male

elementary school teachers

$H_A 4$:   There is a difference in technology use based on change styles of

beginning elementary school teachers

$H_A 5$:   There is a difference in technology use based on change styles of

experienced elementary school teachers

Operational Definitions of the Research Variables

The change style of a teacher is defined as one of the three styles, which is

determined by the Change Style Indicator survey. Based on the scores teachers get from

this survey, they are originators, conservatists or pragmatists. The technology use of a

teacher is measured by a numeric score on the Technology Use survey. This survey has

32 items regarding teachers' use of technology in the classroom. There are five numeric

options for each item. The lowest score a teacher can get is 32 and highest is 160. The

greater the score is the higher the teachers' technology use. A beginning teacher is defined as a teacher who has 3 or less years of teaching experience (these teachers are not eligible for a professional service or continuing contract). An experienced teacher is defined as a teacher who has more than 3 years of teaching experience (these teachers are eligible for a professional service or continuing contract).

Methods

Sample and Sampling Procedures

A sample is the representative group of participants who are selected from a larger population (Salkind, 1997). Samples should be selected from the population in a way that it should represent the population as closely as possible. Selecting a number of individuals to represent the population from which they are selected from is called sampling (Gay, 1996). The purpose of selecting a sample is to gain information about the population. The population of this study is the elementary school teachers in the School District (a pseudonym for an actual school district) in Florida. The sample will be selected from among the elementary school teachers within this school district. The participation is voluntary. The selection criteria are that teachers must be employed by the School District; they must use technology in their classrooms; and they all must be elementary school teachers.

A maximum of 210 and a minimum of 45 elementary school teachers will be selected for the sample group for this study. According to Gall, Gall and Borg (2006) the acceptable minimal sample size per each independent variable is 15. Based on the overall hypotheses and the research questions, there are three independent variables for the current study: change style, gender and teaching experience. Therefore, the minimum

sample size for this study is 45. However, if the number of the eligible and verified responses exceeds 45 by the time the survey is closed to the participants, they will be included in the data analysis. The participation to the study is on a voluntary base.

Two venues of sample group selection are used for this study: The University B's (pseudonym for an actual university) on-campus and off-campus graduate courses; and, the School District's (pseudonym for an actual school district in Florida) elementary schools. The rationale of selecting the University B's on and off campus graduate courses for the sample selection is based on the fact that the researcher wanted to have a diverse sample group for the study. A diverse sample group may enable the researcher to collect data, which may be more representative of the population. Also, the researcher attended to this university for his graduate studies. The School District is selected from among the other school districts in the region because it has a larger technology budget than the other districts and it has been more successful than the other school districts in implementing technology integration into classroom teaching.

The students enrolled in the University B's courses are seeking for a master's or doctoral degree in their fields of specialization. These courses are offered by the University B's School of Education. University B is a higher education institution and a scholarly community committed to the highest academic standards in undergraduate, graduate and professional education. It is accredited by the Commission on Colleges, Southern Association of Colleges and Schools. It offers a variety of career development programs throughout the state of Florida. According to their web site, the School District is a public school district. During 2008-2009, there were 138 elementary schools and 4970 teachers employed by these schools in this District.

The eligibility criteria for the sample group are as follows:

- All participants must be elementary school teachers

- All participants must be using technology in their classrooms

- All participants must be working in the selected School District

Access to potential participants will be gained through individual school principals in the School District and the University B's on and off campus graduate course instructors. Once approval for conducting research is secured from appropriate Institutional Review Boards (IRB) of the School District and the University B, a packet seeking permission to conduct the current study will be mailed to all elementary school principals in the School District in the first week of March 2011. The packet will contain the following documents: a personalized letter to school principals (Appendix D); a "Request to Conduct Survey Research" form (Appendix E); a memo to school's contact person (Appendix F); and, a self-addressed stamped envelope. As required by the School District's IRB, the packet will also include a copy of the School District's IRB approval letter and District Office Approval Memorandum.

The "Request to Conduct Survey Research" form asks principals to indicate an accept (yes) or decline (no) decision to allow elementary school teachers to participate in this study. Those principals who consented to their teachers' participation will be asked to provide the following information: the name of a contact person (not in a supervisory role) who will be able to receive and forward teachers a cover letter via their school e-mail addresses (the cover letter will be e-mailed by the researcher to the contact person); the contact person's e-mail address; the exact number of elementary grade level teachers at the principal's schools; and, the principals' signature as proof of permission granted

allowing the teachers to participate in completing this study's on-line survey. Information provided by school principals on the *"Request to Conduct Survey Research"* (Appendix E) form will allow the researcher to calculate the total sample size by summing the number of elementary school teachers in the School District.

The school principal will sign and return the *"Request to Conduct Survey Research"* form (Appendix E) with the contact person's information in the pre-stamped and addressed envelope to the researcher. The researcher will communicate with the contact persons (Appendix F) at the schools to inform them about the e-mail they will be receiving from the researcher with a cover letter and the recruitment flyer. The contact person at the school will forward this e-mail to all elementary school teachers. The purpose of the recruitment flyer is to give teachers a synopsis of the study in a more informal method to motivate them to read the cover letter. After reading the cover letter if they would like to participate in the study, all potential participants will be directed to the web-based on-line survey instrument hosted by the Survey Monkey by a hyperlink.

Simultaneously, the researcher will contact the course instructors at the University B to deliver the following documents via their e-mail addresses: a personalized letter to course instructor (Appendix G); a cover letter to be forwarded to their students (Appendix H); and, the recruitment flyer (Appendix M). The e-mail addresses of the instructors will be collected from the publicly available resources such as University B's website, course brochures, and instructors' own websites.

The step-by-step sampling process for the *School District Elementary School teachers* is as follows:

Step 1: The packet seeking permission to conduct the current study will be mailed to all elementary school principals in the School District. The packet will contain the following documents:

- A personalized letter to school principals (Appendix D)

- A "Request to Conduct Survey Research" form (Appendix E)

- A memo to school's contact person (Appendix F)

- A self-addressed stamped envelope

- A copy of the School District's IRB approval letter

- District Office Approval Memorandum

Step 2: The school principals will indicate if they accept or decline their teachers' participation in the study by selecting "yes" or "no" on the "Request to Conduct Survey Research" form (Appendix E)

Step 3: Those principals who consented to their teachers' participation will be asked to provide the following information:

- The name of a contact person (not in a supervisory role) who will be able to receive and forward teachers a cover letter (will be e-mailed by the researcher to the contact person) via their school e-mail addresses

- The exact number of elementary grade level teachers at the principal's schools

- The principals' signature as proof of permission granted allowing the teachers to participate in completing this study's on-line survey

Step 4: The researcher will communicate with the contact person via e-mail and deliver the following document:

- A cover letter to be forwarded to all elementary school teachers' school e-mail addresses (Appendix H)

- The Recruitment flyer (Appendix M)

Step 5: The contact person will forward the cover letter to the teachers at his/her school

Step 6: The potential participants will be directed to the web-based survey instrument hosted on SurveyMonkey.com via the forwarded e-mail from the contact person

Step 7: The first part of the survey will determine if a potential participant is eligible for the study or not. If they are not eligible, they will not be able to proceed with the survey. They will be told that they are not eligible based on their initial answers. They will be thanked for their efforts and Survey Monkey will close their session.

Step 8: Follow up contacts will be made by the researcher via the e-mail:

- With the school principals to remind them to return the 'Request to Conduct Survey Study" form (Appendix I)

- With the contact person to remind him/her to forward the cover letter to teachers (Appendix K)

The step-by-step sampling process for the *University B's on and off campus Course Volunteers* is as follows:

Step 1: The researcher will contact the course instructors via their e-mail addresses to deliver the following documents:

- A personalized letter to course instructors (Appendix G)

- The cover letter to be forwarded to his/her students (Appendix H)

- The Recruitment flyer (Appendix M)

Step 2: The course instructor will forward the cover letter and the recruitment flyer to the students in his/her classroom via their e-mail addresses

Step3: The potential participants will be directed to the web-based survey instrument hosted on SurveyMonkey.com via the forwarded e-mail from the course instructor

Step 4: The first part of the survey will determine if a potential participant is eligible for the study or not. If they are not eligible, they will not be able to proceed with the survey. They will be told that they are not eligible based on their initial answers. They will be thanked for their efforts and Survey Monkey will close their session.

Step 5: Follow up contacts will be made by the researcher via e-mail with the course instructors to remind them to forward the cover letter to their students (Appendix L). The instructors will be reminded that some students may not have had a chance to complete the survey.

In order to achieve the desired return rate, researcher will attempt a second contact with the school principals from whom a *"Request to Conduct Survey Research"* form have not been received three weeks after the first mailing of the packets (Appendix I). As citied in Vernaza (unpublished doctoral thesis, Barry University, 2009), Sue and Ritter (2007) indicated that using follow up contacts with the survey participants who had not returned the surveys have the potential to increase the survey response rates. Fowler (2009) also indicated that repeated contacts might increase the response rate of an e-mail based survey. The researcher will follow up with the contact persons at school sites with an e-mail to ask them to re-forward the cover letter to teachers (Appendix K). Simultaneously, the researcher will contact the University B instructors to remind them to forward the cover letter to their students in their graduate courses (Appendix L).

Instrumentation

The data will be derived from a Web-based survey instrument hosted on SurveyMonkey, an on-line survey website. The survey will have the following three main sections:

(1) The Background Questionnaire section (Appendix C)

(2) The Change Style Indicator survey section (Appendix A)

(3) The Teachers' Technology Use survey section (Appendix B)

The background questionnaire.

The researcher developed a short demographic questionnaire to collect demographic information related to the research questions and hypotheses. The questionnaire consists of four questions to determine the key background information of the participants. The demographic questionnaire asked participants to identify their gender, teaching experience in terms of years and whether they use technology to tech in their classrooms. In order to reconfirm that they are elementary school teachers in the School District, a question is asked to confirm that the participant is an elementary school teacher in this school district.

The change style indicator survey.

The Change Style Indicator (CSI) is designed by the Discovery Learning, a company specialized in supplying training tools, designing content, consulting and delivering training programs to all organizations, institutions, groups and individuals. Their programs and products are based on the experiential learning, and individual, team and organizational assessment.

The internal reliability of this instrument is measured by a factor analysis, conducted on a sample of 300 respondents. The CSI items, 22 in total, produced a Cronbach's Alpha of 0.913. The highest single item correlation was 0.64 and the lowest was 0.38. Thus showing that all the items measure the same phenomenon. It also shows that no items are redundant. The external reliability of this instrument is measured by a four-month long reliability test with 100 participants. The test-retest reliability produced a coefficient of 0.92, which indicates that the CSI provides a consistent measurement of an individual's preferred change style. The external validity checks are conducted with an expert panel of five change and assessment experts. They all agreed on the content and wording of each assessment item on the survey (Change Style Guide, 1995).

The Change Style Indicator is designed to measure an individual's preferences in understanding change and in dealing with situations involving change (Musselwhite, 1995). The questions to be answered by this instrument are as follows:

1. Why do some elementary school teachers appear so threatened by change and intent upon preserving the status quo?

2. Why do some elementary school teachers appear constantly dissatisfied with the status quo and ready to challenge the existing paradigm?

3. Why are some elementary school teachers reluctant to take small calculated risks while others seem so eager to take dangerous, unexplored risks?

4. Why are some elementary school teachers able to balance all perspectives and see both sides of an issue while others cannot?

5. Why do some elementary school teachers respond so effectively to gradual incremental change while others seem always oriented toward radical, systemic change?

6. Why do some elementary school teachers appear stuck and unable to take a position in a change situation?

This study focuses on elementary school teachers' change styles and their instructional use of technology in the classroom. The overall question of the study is why some elementary school teachers embrace technologies while others resist such a paradigm. Also, why some teachers are skeptical about using technology, but willing to change their teaching methods if they see that technology is effective.

Based on the results of the Change Style Indicator instrument, an individual is placed on a continuum ranging from a conserver orientation to an originator orientation. A pragmatist orientation is placed at the center of the change style continuum. The closer to one end of this continuum, the stronger the preference for a conserver or originator approach to change. Conservers prefer to preserve the existing paradigm or system. They prefer gradual and incremental change in their environment. Originators prefer to challenge the existing paradigm or system. They take a faster and more radical approach to change, thus resulting in fundamentally different, sometimes systemic changes. The pragmatists, on the other hand prefer change that is functional. They are interested what will work better in a given situation. Pragmatists prefer to question and explore the current paradigm in an open and objective manner. It should be pointed out here that the Change Style Indicator measures an individual preference, not effectiveness or skill at utilizing a preferred change style.

The main characteristics of *conservers* are as follows:

May appear disciplined, precise, methodical, cautious,

Solve problems while maintaining the integrity of the current paradigm,

Prefer solutions that are tested and proven,

Accept conventional assumptions,

Enjoy predictability,

Prefer group problem-solving and decision-making

Improve efficiency while maximizing continuity and stability,

May confuse the means with the end.

The main characteristics of the *originators* are as follows:

May appear undisciplined, unorganized, abstract, spontaneous,

Solve problems in ways that challenge the current paradigms,

Prefer quick and expansive change,

Challenge accepted assumptions,

Enjoy risk,

Serve as catalyst to established groups,

Focus on individual contributions,

May appear as visionary and systemic in their thinking,

May treat accepted policies/procedures with little regard.

The main characteristics of the *pragmatists* are as follows:

May appear practical, agreeable, flexible,

Solve problems in ways that emphasize workable outcomes,

Are more focused on results than structure/organization,

Serve as mediators and bridges,

See both sides of an argument,

Explore accepted assumptions when appropriate,

May take more of a middle-of-the-road approach.

As mentioned before, the change style of a teacher is considered as a continuum based model that places him/her in one of these three main groups. A pragmatist orientation is placed at the center of the change style continuum. The closer to one end of this continuum, the stronger the preference for a conserver or originator approach to change.

The teachers' technology use survey.

To measure elementary school teachers' technology use in the classrooms, the Teacher Technology Literacy instrument, developed by the Florida Department of Education (FLDOE) in 2004, is used. This tool is developed by Parshall, Harmes, Jones, and Rendina-Gobioff (2004) at the Office of Educational Technology (OET). The purpose of this instrument is to measure teachers' performance indicators in technology use in the classrooms. The performance indicators are carefully developed with attention to state and national technology standards. Technology supervisors and classroom teachers reviewed these indicators for accuracy (Parshall, 2004). The internal reliability of this survey is measured by the Cronbach's Alpha, which measures the internal consistency of the instrument. A sample group of 533 participants were used for the reliability tests. The Cronbach's Alpha score of this instrument was .079, which indicates the internal consistency of the instrument is strong.

Technology use and performance indicators used in this survey were based on the technology use standards by the National Educational Technology Standards (NETS). National and state technology standards were the basis for the performance indicators. These technology use indicators were reviewed online by technology supervisors and classroom teachers.

During the development of the survey, several focus group evaluation sessions were held in Orlando, Miami and Pensacola. Each group session included between 6 and 13 teachers in the surrounding areas. These teachers had varied experience with computers from entry-level to advanced skills. Two pilot tests were also conducted before finalizing the development of the tool. Each pilot case included approximately 20 to 45 teachers with different technology skills.

As indicated in the final evaluation report, the developed survey tool was "found to be a sound assessment tool for the intended purpose" (Florida Department of Education, 2004, p.4). The two validity studies, designed to address content and construct validity, showed that the survey tool is measuring the targeted aspects of teachers' technology literacy and use. The test quality was evaluated by considering item analyses, test reliability, and test validity. It showed reasonable item analysis, reliability and validity results for the mastery test. Reliability was estimated for the inventory for the total score, using internal consistency, or Cronbach's alpha reliability. The technology use indicators were carefully developed with attention to state and national technology standards. The Cronbach's Alpha score of this instrument was .079, which indicates the internal consistency of the instrument is strong.

Design of the Study

The purpose of this study is to investigate the effect of change styles on instructional technology use by elementary school teachers in a classroom setting. In addition, this study aims to investigate, analyze and understand the differences of these teachers' technology use based on their gender and teaching experience.

The causal-comparative research approach is selected to test the hypotheses of the study. Since it is focused on the already existing conditions (change style of teachers and their technology use), the causal-comparative approach is the most appropriate approach. According to Gay (1996), the causal-comparative research attempts to determine the reasons for the current status of the phenomena under study. Gay defines the causal-comparative research as " a research in which the researcher attempts to determine the cause, or reason, for existing differences in the behavior or status of groups or individuals" (Gay, 1996, p.321).

The purpose of this type research is to determine the reason that has created the difference in groups or individuals. Isaac & Michael (1997) indicate that causal-comparative research is "ex post facto", meaning the researcher collects the data after all events have already occurred. By working on one or more dependent variables of the subject, the researcher seeks out the causes and tries to establish the relationships and their meanings. The researcher attempts to determine the reasons or causes for an existing condition in order to identify the main factors for a difference between groups or individuals.

In scientific research, one of the challenging tasks is the search for causes, the reason why some sort of behavior form (DeJong, Monette, & Sullivan, 1998). It is

difficult, because it cannot be directly observed. Why some teachers embrace technology use in the classroom? Why some teachers resist any acceptance of diffusion of technology in their teaching? Through causal-comparative research, these kinds of questions may be investigated to find any cause-effect relationships between the variables of the study.

The independent variable is change style. The change style of a teacher is defined as one of the three styles, which was determined by a score on the Change Style Indicator survey. Based on their scores teachers will receive from this survey, they will be labeled as originators, conservatists or pragmatists. The technology use of a teacher is measured in a numeric number by the Technology Use survey. This survey has 32 items regarding teachers' use of technology in the classroom. There are five numeric options for each item. The lowest score a teacher can get is 32 and highest is 160. The greater the score is the higher the teachers' technology use. A beginning teacher is defined as a teacher who has 3 or less years of teaching experience (these teachers are not eligible for a professional service or continuing contract). An experienced teacher is defined as a teacher who has more than 3 years of teaching experience (these teachers are eligible for a professional service or continuing contract).

Creswell's (2002) six steps of hypothesis testing is used in this study. These steps are:

- establish null/research hypotheses
- determine the level of significance
- collect data
- compute the data

- decide to reject or failing to reject the null hypothesis

- determine the magnitude of differences in case of a statistically

  significant relationship is established among the tested variables

In order to analyze the effect of the change styles on instructional technology use by elementary school teachers in a classroom setting, a one-way analysis of variance (ANOVA) will be used. The Statistical Package for the Social Sciences (SPSS, Version 18.00 for Windows) will be used to classify, analyze and organize the collected data. SPSS is "one of the most useful and popular statistical packages" (Gay, 1996, p.426) used for statistical analysis and it provides many statistics frequently used in research studies.

Data Collection and Processing Procedures

Data collection will occur between March 2011 and March 2012. Cover letters inviting elementary school teachers to participate in this study will be sent via e-mail by the researcher to the contact persons at the elementary schools in the School District and course instructors at the University B. Teachers who respond to the e-mail will be directed to access the on-line survey site through an active link contained in the cover letter (as a form of convenience).

Cover letters will include an appeal to teachers' self-interest by indicating that their participation may contribute to the field of education and literature focusing on the effect of change styles on instructional technology use by elementary school teachers. Anonymity of teachers' identity, Internet protocol (IP) addresses, and survey data are assured. The participants are explained the details regarding the procedures carried out by

the researcher to safeguard the privacy of all data. The descriptions of data utilization and reporting and who would be able to access it are also described.

In order to obtain the research data from the Survey Monkey and to prepare it to be entered into SPSS, the researcher will follow these steps:

1. Print-out the completed and verified responses to the on-line survey

2. Identify each response with an alphanumeric code (S001, S002, etc.)

3. Calculate the technology use score of each respondent

4. Determine the change style of each respondent based on the total change style score

5. Record the number of verified responses to the on-line survey questions for each group

6. Implement a process of record keeping to ensure equal representation of each change style group

7. Enter the data into the SPSS for statistical data analysis

Once the verified responses are coded and readied for the SPSS, the researcher will start entering the data into the database for analysis.

Data Analysis Procedures

In order to analyze the effect of the change styles on instructional technology use by elementary school teachers in the classrooms, a one-way analysis of variance (ANOVA) was used. Since interaction effects were not investigated, factorial analysis was not employed.

A causal-comparative study utilizes both descriptive and inferential statistics for the analysis of the research data (Gay, 1996). Mean and the standard deviation are the

two most commonly used descriptive statistics for the causal-comparative studies in general. Means and standard deviations will be calculated. Tables, charts and other graphics will be created for data organization and presentation of the research findings.

The Statistical Package for the Social Sciences (SPSS, Version 18.00 for Windows) is used to classify, analyze and organize the collected data. SPSS is "one of the most useful and popular statistical packages" (Gay, 1996, p.426) used for statistical analysis, because it provides many statistics frequently used in research studies.

Ethical Considerations

In order to protect the names of the institutions, cities, counties and school districts involved in the study, the pseudonyms will be used. Unless it is required by the IRB boards, the real names of these places and institutions will not be revealed at any point in the study. The University, for example, will be mentioned as the "University B". However, the reader will be informed that University B is a pseudonym for an actual university.

In order to protect the identities of the participants, a coding system will be used. The coding system will be consisted of alpha-numeric codes. All confidential records of the study will be stored in a locked file in the researcher's office. The personal data (names, e-mails, etc.) will be stored separately. The records of the study will be kept in the locked files for five years and then will be destroyed by using shredders.

The researcher will begin collecting data from the sample group only after the required approvals granted from the University B's and the School District's IRB boards in February of 2011. In order to protect the anonymity and confidentiality of the data, the

survey instruments will be coded by assigning them an alphanumeric code. The anonymity of the participants will be protected throughout the study.

The participants will be fully informed about the purpose and significance of the study. They will be informed about the researcher, research institution, survey instruments, type of data to be collected, and the time required to complete the survey instruments. The names, e-mails, mailing addresses or other personal data of the participants will be never shared with other participants or individuals. During the data analysis process, only the codes will be used in order to protect the identity of the participants. The participation to the study is totally voluntary and participants have the option not to participate at any level of the study.

The Internet protocol (IP) addresses used to access the survey instruments on Surveymonkey.com cannot be tracked. The researcher will print out the teachers' survey responses in order to obtain hard copies for data analysis procedures. The data will be kept in a locked file in the researcher's office for a minimum of five years and then destroyed thereafter. Survey data contained within the Internet survey database will be saved on storage media; data contained within the Internet database will then be deleted immediately thereafter. Data saved on the storage media will be retained for a minimum of five years and then deleted.

Chapter Summary

This chapter described the methodology of the study. Based on its beliefs and principles, the constructivist perspective established itself as the philosophical framework. Fullan (2007) indicated that computer and information technologies have changed the learning and teaching process in the classrooms. Glenn and Knapp (1996)

suggested that teaching and learning in today's technology rich classrooms must focus on engaging learners in activities to help them to construct their own knowledge and understandings of the concepts (Glenn & Knapp, 1996).

The casual comparative research approach was selected to test the research hypotheses. The research questions and hypotheses of the study were about the effects of elementary school teachers' change styles on their instructional use of technology. The change styles and the technology uses of teachers already existed conditions, meaning they already had happened.

The Change Style Indicator was used to determine the change style of participating teachers. The Technology Use Survey was used to determine the technology use of teachers in the classrooms. The participants of the study selected from the School District. A maximum of 210 and a minimum of 45 elementary school teachers will be selected for the sample group for this study. The participation to the study is voluntary. The one-way analysis of variance (ANOVA) at the .05 level of significance will be used to analyze the data. The Statistical Package for Social Sciences (SPSS) for Windows was used for statistical tests. The same program was used for organizing, classifying and analyzing the collected data. Descriptive and inferential statistics were used for the study. The alpha significance level of 0.05 was used for all statistical analysis.

CHAPTER IV

RESULTS OF THE STUDY

Introduction

This chapter focuses on the results of the data analysis procedures used to address this study's research questions and hypotheses. Furthermore, this chapter discusses the nature of the collected data and research findings.

The purpose of this causal-comparative study was to investigate the effect of change styles on instructional technology use by elementary school teachers in a classroom setting. Furthermore, this study intended to investigate, analyze and understand the effect of gender and teaching experience on the instructional technology use by teachers based on their change styles in an elementary school classroom. The hypotheses of the study, stated in the null, were as follows:

$H_0 1$:   There is no difference in technology use based on change styles of elementary school teachers

$H_0 2$:   There is no difference in technology use based on change styles of female elementary school teachers

$H_0 3$:   There is no difference in technology use based on change styles of male elementary school teachers

$H_0 4$:   There is no difference in technology use based on change styles of beginning elementary school teachers

$H_0 5$:   There is no difference in technology use based on change styles of experienced elementary school teachers

The research questions were as follows:

*R*1:   Is there a difference in technology use based on change styles of elementary school teachers?

*R*2:   Is there a difference in technology use based on change styles of female elementary school teachers?

*R*3:   Is there a difference in technology use based on change styles of male elementary school teachers?

*R*4:   Is there a difference in technology use based on change styles of beginning elementary school teachers?

*R*5:   Is there a difference in technology use based on change styles of experienced elementary school teachers?

The independent variables of the research were the change style, gender and teaching experience of elementary school teachers; the dependent variable was the instructional technology use in a classroom setting. Since interaction effects were not investigated, factorial analysis was not employed.

The change style of a teacher is defined as one of the three styles, which is determined by the Change Style Indicator (Appendix A) survey. Based on the scores teachers receive from this survey, they are originators, conservatists or pragmatists. The technology use of a teacher is measured by a numeric score on the Technology Use survey (Appendix B). This survey has 32 items regarding teachers' use of technology in the classroom. There are five numeric options for each item. The lowest score possible was 32 and the highest was 160. The greater the score the higher use of technology. A beginning teacher is defined as a teacher who has 3 or less years of teaching experience (these teachers are not eligible for a professional service or continuing contract). An

experienced teacher is defined as a teacher who has more than 3 years of teaching

experience (these teachers are eligible for a professional service or continuing contract).

Descriptive Data for the Demographic Information

A total of 112 participants completed the on-line survey. Nine of those surveys

were discarded due to the missing data. The total number of eligible responses for the

study was 103. The researcher verified each response based on these three eligibility

criteria: (1) all respondents must be elementary school teachers, (2) all respondents must

use instructional technology for teaching in their classrooms, and (3) all respondents must

be elementary school teachers in the School District. After verification, the researcher

printed out the responses and gave each one an alphanumeric code (S001, S002, S003,

etc.) to start the data analysis process. After the coding, each respondent's technology

use score is calculated based on the options on the technology use scale. After the

technology score is determined, the next step was to determine the change style group of

the respondent. Based on the scoring sheet provided by the Discovery Learning, Inc.,

which is the creator of the Change Style Indicator used in this study, each respondent's

change style is determined. The step-by-step process followed by the researcher as

follows:

1. Print-out the completed and verified responses to the on-line survey

2. Identify each response with an alphanumeric code (S001, S002, etc.)

3. Calculate the technology use score of each respondent

4. Determine the change style of each respondent based on the total change style

    score

5. Record the number of verified responses to the on-line survey questions for each group

6. Implement a process of record keeping to ensure equal representation of each change style group

7. Enter the data into the SPSS for statistical data analysis

Since the originator change style group had only 27 participants, the researcher randomly selected 27 participants for each of the pragmatist and conservatist change style groups. Hence, equalizing the number of the participants in each of the three change style groups. As a result, a total of 81 eligible and verified responses to the on-line surveys (27 for each group) were selected for the data analysis.

Gender Distribution of Participants

The number of female elementary school teacher participants is 52 (64.2 %), while the male teachers' number is 29 (35.8 %). Table 3 illustrates the gender frequency distribution of the volunteer participants from the Elementary Schools in the School District.

Table 3

Gender Distribution of Participants

	Frequency	Percent
Male Teachers	29	35.8
Female Teachers	52	64.2
Total	81	100.0

Teaching Experience Distribution of Participants

The participants' teaching experience was based on the number of years they have

been teaching in an elementary school in the School District. A beginning teacher is

defined as a teacher who has 3 or less years of teaching experience (these teachers are not

eligible for a professional service or continuing contract). An experienced teacher is

defined as a teacher who has more than 3 years of teaching experience (these teachers are

eligible for a professional service or continuing contract).

Table 4 displays the teaching experience frequency distribution of the volunteer

participants from the elementary schools in the School District. The number of beginning

elementary school teachers is 13 (16%), while the experienced elementary school

teachers' number is 68 (84 %).

Table 4

Teaching Experience Distribution of Participants

	Frequency	Percent
Beginning Teachers	13	16.0
Experienced Teachers	68	84.0
Total	81	100.0

Change Style Distribution of Participants by Change Style Groups

The change style of a teacher is defined as one of the three styles, which is

determined by the Change Style Indicator survey. Based on the scores teachers get from

this survey, they are originators, conservatists or pragmatists. Table 5 illustrates the

change style frequency distribution of the volunteer participants from the Elementary

Schools in the School District.

Table 5

Change Style Distribution of Participants

	Frequency	Percent
Originators	27	33.3
Pragmatists	27	33.3
Conservatists	27	33.3
Total	81	100.0

Based on the scoring method of the Change Style Indicator, a participant is placed

on a continuum ranging from a conserver orientation to an originator orientation. A

pragmatist orientation is placed at the center of the change style continuum. The closer to

one end of this continuum, the stronger the preference for a conserver or originator

approach to change. Conservers prefer to preserve the existing paradigm or system. They

prefer gradual and incremental change in their environment. Originators prefer to

challenge the existing paradigm or system. They take a faster and more radical approach

to change, thus resulting in fundamentally different, sometimes systemic changes. The

pragmatists, on the other hand prefer change that is functional. They are interested what

will work better in a given situation. Pragmatists prefer to question and explore the

current paradigm in an open and objective manner. It should be pointed out here that the

Change Style Indicator measures an individual preference, not effectiveness or skill at

utilizing a preferred change style.

Research Findings

The analysis of variance (ANOVA) statistical test was used to compare all sample means simultaneously and to determine whether or not a statistical significance existed somewhere in the data. Since interaction effects were not investigated, factorial analysis was not employed. The alpha significance level of 0.05 was used for all statistical analysis for this study. The Statistical Package for the Social Sciences (SPSS, Version 18.00 for Windows) was used to classify, analyze and organize the collected data.

In this section, change style and elementary school teachers' instructional technology use is discussed. Additionally, change style and female teachers' instructional technology use, change style and male elementary school teachers' instructional technology use, change style and beginning elementary school teachers' instructional technology use and change style and experienced elementary school teachers' instructional technology use are discussed.

Change Style and Elementary School Teachers' Instructional Technology Use

The results of this study provide sufficient evidence that the change styles of elementary school teachers effect their instructional technology use in a classroom setting. Table 6 exhibits the instructional technology use by elementary school teachers based on their change styles. The instructional technology use by elementary school teachers in a classroom setting is significantly effected by the way they respond and manage changes around them; the effect of change styles on the instructional technology use by elementary school teachers is significant at the 0.05 level. Therefore, the null hypothesis is rejected which states that there is no difference in instructional technology use by elementary school teachers based on their change styles.

Table 6

ANOVA: Instructional Technology Use by Participants Based on Their Change Styles

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	3973.062	2	1986.531	14.332	.000
Within Groups	10811.778	78	138.613		
Total	14784.840	80			

Overall, the originators have scored higher than the other two groups (pragmatists and conservatists) in using technology for instruction in their classrooms. The pragmatists scored higher than the conservatists, but lower than the originators. The conservatists scored the lowest in the technology use category, lower than both the originators and pragmatists. Table 7 exhibits the descriptive data of the overall instructional technology use based on the change style of elementary school teachers.

Table 7

Descriptives: Instructional Technology Use by Participants Based on Their Change Styles

	N	Mean	Std. Deviation
Originators	27	93.04	10.052
Pragmatists	27	79.26	14.522
Conservatists	27	77.30	10.194
Total	81	83.20	13.595

Table 8 exhibits the multiple comparisons of instructional technology use by participants based on their change styles. When compared to pragmatists and conservatists, the originators have a significantly higher mean score of technology use than the other two groups. Even though the pragmatists' average technology use score is higher than the conservatists, the difference is not significant at the 0.05 level.

Table 8

Post Hoc Tests: Multiple Comparisons of Participants' Instructional Technology Use

Based on Their Change Styles-Tukey HSD

Change Style Group	Change Style Group Comparisons	Mean Difference	Std. Error	Sig.
Originators	Pragmatists	13.778*	3.204	.000
	Conservatists	15.741*	3.204	.000
Pragmatists	Originators	-13.778*	3.204	.000
	Conservatists	1.963	3.204	.814
Conservatists	Originators	-15.741*	3.204	.000
	Pragmatists	-1.963	3.204	.814

*. The mean difference is significant at the 0.05 level.

Change Style and Female Elementary School Teachers' Instructional Technology Use

The results of this study revealed that there is no difference in instructional technology use by female elementary school teachers based on their change styles. The ANOVA table (Table 9) exhibits that the technology use score of female teachers based on their change styles is not significant the 0.05 level. Therefore, the null hypothesis is not rejected which states that there is no difference in technology use of female elementary school teachers based on their change styles.

Table 9

ANOVA: Instructional Technology Use by Female Teachers Based on Their Change Styles

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	761.049	2	380.524	2.301	.111
Within Groups	7937.579	48	165.366		
Total	8698.627	50			

Table 10 exhibits the descriptives of instructional technology use by female teachers based on their change styles. On average, the originator female teachers scored 88.00 points in instructional technology use. The pragmatist female teachers scored 78.63 and the conservatist female teachers scored 79.79.

Table 10

Descriptives of Instructional Technology Use by Female Teachers Based on Their Change Styles

	N	Mean	Std. Deviation
Originator Female Teachers	13	88.00	9.531
Pragmatist Female Teachers	19	78.63	16.453
Conservatist Female Teachers	19	79.79	10.475
Total	51	81.45	13.190

Table 11 provides the multiple comparisons of instructional technology use by female elementary school teachers based on their change styles. The mean differences among the female elementary school teachers' change style groups are not significant at

94

the 0.05 level. The mean difference between the originator female elementary school teachers and the pragmatist elementary school teachers is 9.368. The mean difference between the pragmatist female elementary school teachers and the conservatist elementary school teachers is –1.158. The mean difference between the originator female elementary school teachers and the conservatist elementary school teachers is 8.221.

Table 11

Post Hoc Tests: Multiple Comparisons of Instructional Technology Use by Female Teachers-Tukey HSD

Change Style and Female Teachers	Change Style and Female Teachers' Comparisons	Mean Difference	Std. Error	Sig.
Originator Female Teachers	Pragmatist Female Teachers	9.368	4.629	.117
	Conservatist Female Teachers	8.211	4.629	.189
Pragmatist Female Teachers	Originator Female Teachers	-9.368	4.629	.117
	Conservatist Female Teachers	-1.158	4.172	.958
Conservatist Female Teachers	Originator Female Teachers	-8.211	4.629	.189
	Pragmatist Female Teachers	1.158	4.172	.958

Change Style and Male Elementary School Teachers' Instructional Technology Use

The findings of this study revealed that there is a significant difference in instructional technology use by male elementary school teachers based on their change styles. The ANOVA table (Table 12) compares the mean scores of male elementary school teachers' technology use in a classroom setting based on their change styles. The technology use score of male teachers is significant the 0.05 level. Therefore, the null

hypothesis is rejected which states that there is no difference in technology use of male elementary school teachers based on their change styles in a classroom setting.

Table 12

ANOVA: Instructional Technology Use by Male Teachers

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	3801.170	2	1900.585	27.791	.000
Within Groups	1778.071	26	68.387		
Total	5579.241	28			

On average, the originator male teachers scored 97.71 in instructional technology use. The pragmatist male teachers scored 80.75 and the conservatist male teachers scored 70.57. Table 13 exhibits the descriptive data of the instructional technology use by male elementary school teachers based on their change styles.

Table 13

Descriptives: Instructional Technology Use by Male Teachers

	N	Mean	Std. Deviation
Originator Male Teachers	14	97.71	8.324
Pragmatist Male Teachers	8	80.75	9.146
Conservatist Male Teachers	7	70.57	6.973
Total	29	86.48	14.116

Table 14 provides the multiple comparisons of instructional technology use by male elementary school teachers. The mean difference between the originator male teachers and pragmatists male teachers is significant at the 0.05 level. Furthermore, the

mean difference between the originator male teachers and the conservatist male teachers is significant at the 0.05 level. However, the mean difference between the pragmatist male teachers and the convervatist male teachers is not significant the 0.05 level. Even though the pragmatist male teachers have scored higher in instructional technology use on average than their conservatist counterparts as exhibited in Table 14, the difference is not significant at the 0.05 level.

Table 14

Post Hoc Tests: Multiple Comparisons of Instructional Technology Use by Male Teachers-Tukey HSD

Change Style and Male Teachers	Change Style and Male Teachers' Comparisons	Mean Difference	Std. Error	Sig.
Originator Male Teachers	Pragmatist Male Teachers	16.964*	3.665	.000
	Convervatist Male Teachers	27.143*	3.828	.000
Pragmatist Male Teachers	Originator Male Teachers	-16.964*	3.665	.000
	Convervatist Male Teachers	10.179	4.280	.063
Convervatist Male Teachers	Originator Male Teachers	-27.143*	3.828	.000
	Pragmatist Male Teachers	-10.179	4.280	.063

*. The mean difference is significant at the 0.05 level.

Change Style and Beginning Elementary School Teachers' Instructional Technology Use

The results of this study provide sufficient evidence that there is a difference in instructional technology use by beginning elementary school teachers based on their change styles. The ANOVA table below (Table 15) exhibits that instructional technology

use by beginning elementary school teachers is significant at the 0.05 level. Therefore, the null hypothesis is rejected which states that there is no difference in instructional technology use by beginning elementary school teachers based on their change styles.

Table 15

ANOVA: Instructional Technology Use by Beginning Elementary School Teachers

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	1190.893	2	595.446	5.816	.024
Within Groups	921.357	9	102.373		
Total	2112.250	11			

Table 16 exhibits the descriptive statistics of the instructional technology use by beginning elementary school teachers. Beginning originators teachers have a mean score of 94.86 while pragmatists have a mean score of 82.00 and conservatists' score is 68.50. In the sample group, there were a total of 12 beginning teachers. Seven of them were originators, three were pragmatists and two were conservatists.

Table 16

Descriptives: Instructional Technology Use by Beginning Elementary School Teachers

	N	Mean	Std. Deviation	Std. Error
Beginning Teachers-Originators	7	94.86	11.880	4.490
Beginning Teachers-Pragmatists	3	82.00	5.000	2.887
Beginning Teachers-Conservatists	2	68.50	4.950	3.500
Total	12	87.25	13.857	4.000

Table 17 illustrates the multiple comparisons of instructional technology use by beginning elementary school teachers based on their change styles. The beginning originator teachers use instructional technology in their classrooms more often than the conservatist beginning elementary school teachers. The difference between these two groups is significant at 0.05 level.

However, the instructional technology use difference between the beginning originator teachers and beginning pragmatist teachers is not significant at the 0.05 level. Even though the mean score of the originator is 12.86 points higher than the pragmatist teachers, this difference is not found significant.

Compared to the beginning conservatist elementary school teachers, the pragmatist elementary school teachers have a higher average score in instructional technology use. The mean score difference between these two groups is 13.5. However, this difference is not significant at the 0.05 level.

Table 17

Post Hoc Tests: Multiple Comparisons of Instructional Technology Use by Beginning

Elementary School Teachers-Tukey HSD

Change Style and Beginning Teachers	Change Style and Beginning Teachers' Comparisons	Mean Difference	Std. Error	Sig.
Beginning Teachers-Originators	Beginning Teachers-Pragmatists	12.857	6.982	.211
	Beginning Teachers-Conservatists	26.357*	8.112	.025
Beginning Teachers-Pragmatists	Beginning Teachers-Originators	-12.857	6.982	.211
	Beginning Teachers-Conservatists	13.500	9.236	.353
Beginning Teachers-Conservatists	Beginning Teachers-Originators	-26.357*	8.112	.025
	Beginning Teachers-Pragmatists	-13.500	9.236	.353

*. The mean difference is significant at the 0.05 level.

Change Style and Experienced Elementary School Teachers' Instructional Technology Use

The results of this study provide sufficient evidence that there is a difference in instructional technology use by experienced elementary school teachers based on their change styles. The ANOVA table below (Table 18) exhibits that instructional technology use by experienced elementary school teachers is significant at the 0.05 level. Therefore, the null hypothesis is rejected which states that there is no significant difference in

instructional technology use by experienced elementary school teachers based on their change styles.

Table 18

ANOVA: Instructional Technology Use by Experienced Elementary School Teachers

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	2930.160	2	1465.080	10.019	.000
Within Groups	9504.781	65	146.227		
Total	12434.941	67			

Table 19 exhibits the descriptive statistics of the technology use by experienced elementary school teachers. The originators have a mean score of 93.05 while pragmatists have a mean score of 78.92 and conservatists' score is 78.00. A total of 68 experienced elementary school teachers participated in this study.

Table 19

Descriptives: Instructional Technology Use by Experienced Elementary School Teachers

	N	Mean	Std. Deviation	Std. Error
Experienced Teachers-Originators	19	93.05	9.390	2.154
Experienced Teachers-Pragmatists	24	78.92	15.334	3.130
Experienced Teachers-Conservatist	25	78.00	10.227	2.045
Total	68	82.53	13.623	1.652

Table 20 illustrates the multiple comparisons of instructional technology use by experienced elementary school teachers based on their change styles. The experienced originator teachers use instructional technology in their classrooms more often than the pragmatist and conservatist elementary school teachers. The difference is significant at 0.05 level.

However, the instructional technology use difference between the experienced pragmatist teachers and conservatist teachers is not significant at the 0.05 level. Even though the mean score of the originator teachers' is .917 points higher than the pragmatist teachers' score, this difference is not found significant at 0.05 level.

Table 20

Post Hoc Tests: Multiple Comparisons of Instructional Technology Use by Experienced Elementary School Teachers-Tukey HSD

Change Style and Experienced Teachers	Change Style and Experienced Teachers' Comparisons	Mean Difference	Std. Error	Sig.
Experienced Teachers-Originators	Experienced Teachers-Pragmatists	14.136*	3.713	.001
	Experienced Teachers-Conservatist	15.053*	3.680	.000
Experienced Teachers-Pragmatists	Experienced Teachers-Originators	-14.136*	3.713	.001
	Experienced Teachers-Conservatist	.917	3.456	.962
Experienced Teachers-Conservatist	Experienced Teachers-Originators	-15.053*	3.680	.000
	Experienced Teachers-Pragmatists	-.917	3.456	.962

 *. The mean difference is significant at the 0.05 level.

Summary of Results

In order to address the research questions and hypotheses of this study, the analysis of variance (ANOVA) statistical test was used to compare all sample means simultaneously and to determine whether or not a statistical significant existed somewhere in the data. The alpha significance level of 0.05 was used for all statistical analysis for this study.

The results of this study illustrated that there is a significant difference in instructional technology use by elementary school teachers in a classroom setting based on their change styles. The originator-teachers use technology in their classrooms more often than the pragmatists and conservatists. The pragmatist-teachers use technology less than the originator-teachers but more than the conservatist-teachers. The conservatist-teachers, on the other hand, use instructional technology at the lowest levels compared to previous two groups.

The change styles of female elementary school teachers did not significantly effect their instructional technology use in a classroom setting. The change styles of male teachers, on the other hand, had a significant effect on their instructional technology use. The beginning and experienced elementary school teachers' change styles did significantly effect their instructional technology use in a classroom setting.

CHAPTER V

DISCUSSION OF THE FINDINGS

Introduction

This chapter presents an examination of findings of the study as they relate to the

research questions and hypotheses. The examination will involve the purpose,

significance, method, limitations, discussion of the findings, and recommendations.

This study was intended to add to the broad body of scientific knowledge about

the effect of change styles on the instructional technology use by elementary school

teachers in a classroom setting. The data collected from the surveys provided answers to

the following research question: Is there a difference in instructional technology use

based on the change styles of elementary school teachers in a classroom setting? A total

of 81 elementary school teachers from the School District in Florida voluntarily

participated in this study.

Survey Monkey was used to collect electronic data from the elementary school

teachers who responded by completing the on-line surveys. The technology use of

participants was measured with the Technology Use Survey (Appendix B), which was

developed by the Florida State's Department of Education. This survey has 32 items

regarding teachers' use of instructional technology in the classroom. There are five

numeric options for each item. The lowest score possible was 32 and the highest was 160.

The greater the score the higher use of technology. The change style of participants was

determined with the Change Style Indicator (Appendix A) survey, which was developed

by the Discovery Learning, Inc. Based on the scores teachers receive from this survey,

they are originators, conservatists or pragmatists. The researcher developed a short

background survey for the study (Appendix C).

The one-way analysis of variance (ANOVA) statistical test was used to compare

all sample means simultaneously and to determine whether or not a statistical

significance among the data collected.

Summary of the Study

Recent advances and developments in instructional technology have changed how

today's children learn and how teachers teach in the classrooms (Fullan, 2007). As

reported in the National Education Technology Plan 2010 (NETP), advances in science

and education in recent decades expanded our understanding of how human beings learn

and understand the environment surrounding them. The instructional technology use, the

NETP plan suggested, can and should help teachers to provide insights of new ways of

learning and teaching with technology in the classrooms (U.S. Department of Education,

2010). Otto and Albion (2004) suggested that even though the new technologies are

widely available in the classrooms, they are not fully integrated into the classroom

teaching and learning activities. The critical challenge for elementary school teachers is

to successfully implement new teaching methods with technology in their classrooms

(Hall, 2010). Effective learning in a classroom depends on effective teaching and

effective teaching requires teachers to be effective and efficient users of instructional

technology in their classrooms. Technology in itself can not change the current education

system and it can only make a difference when successfully integrated into the

curriculum (Muir-Herzig, 2004). However, teachers differ in using instructional

technology in their classrooms based on how they deal with change and situations

involving change. This is where teachers' change styles play a critical and significant role. Some teachers use instructional technology at a minimum level and in a traditional teacher-centered model of teaching (conservatist teachers). Some other teachers use instructional technology to support student-centered teaching methods with a constructivist approach to teaching (originator teachers). Yet, some others are in between these two groups (pragmatists teachers) and they look for evidence that the use of instructional technology increases quality of education in the classrooms (pragmatist teachers). Regardless of the promising power of the new instructional technologies, if a teacher is a conservative teacher for example, the promised outcomes of teaching with technology may not be attained.

This study focused on the change styles of teachers and its effect on the use of instructional technology by elementary school teachers in a classroom setting. In the following sections, the purpose and significance of the study is explained; method of the research and limitations are discussed.

Purpose

The purpose of this causal-comparative study was to investigate the effect of change styles on instructional technology use by elementary school teachers in a classroom setting. The intent was to determine how the change styles of teachers effect their instructional technology use. A change style reflects an aspect of a teacher's personality. It reflects a teacher's individual preference about dealing with change and situations involving change (Musselwhite & Ingram, 1993). Furthermore, the goal of this research was to investigate and analyze the effect of gender and teaching experience on teachers' instructional technology use based on their change styles in a classroom setting.

The current data in the literature about the instructional technology use mostly consists of numbers (computer student ratio, internet connection to classroom ratio, etc). While this type of data is vital to provide quality education, determining how often these technologies are used and how teachers' change styles effect their instructional technology use are even more vital. By focusing on the teachers and determining how these instructional technologies change their teaching styles and how and why they respond to new ways of teaching with technology are critical factors to determine if the desired teaching outcomes will be attained by integrating these technologies into classroom teaching. There are teachers who change and adapt their teaching styles based on the technology available to them in the classroom; there are teachers, who persist using these technologies at a minimum level, mostly for drill and practice activities; and there are also some teachers who do not see any value of using these technologies for teaching and learning. As Fullan suggested (2007), for any kind of educational reform to be effective through these computer and information technologies, real change must be analyzed at the school, and particularly, at the individual teacher level. Means (1993) suggested that one of the basic components of educational reform is the individual teacher. While the schools provide the learning goals and culture, it is the teacher who decides the way students learn.

On a broader perspective, the question becomes why some elementary school teachers infuse instructional technologies into their teaching willingly while others resist such a paradigm; and, why some teachers are skeptical about using these technologies, but willing to change their teaching methods if they are convinced that teaching with technology can produce desired outcomes. Despite research indicating that student-

centered, collaborative and mentoring methods are more effective teaching strategies (Clark-Mudura & Dede, 2010), most teachers find it difficult, and sometimes impossible, to integrate these methods into their teaching. School principals, policy makers and educators should understand the effect of change styles of teachers on the instructional technology use. By providing some much needed data on the subject, this study may help teachers, school principals, educators and policy makers the effect of change styles on instructional technology use by elementary school teachers in a classroom setting.

Significance

The success of integrating computer and information technologies into classroom teaching much depends on how the teachers adapt to these technologies. Teachers should be affective change agents to be able to make use of these technologies in today's classrooms (Bangkok, 2004). The literature regarding the integration of instructional technology in elementary schools is extensive and continues to emerge. Researchers have conducted studies on a variety of educational technologies in vastly different environments and settings on different subject areas. Yet, despite the profusion of interest and inquiry, the research related to the effect of elementary school teachers' preferred approach to deal with teaching technology in the classrooms is rather limited. Particularly, the research about the effect of elementary school teachers' change styles on their instructional use of these technologies is almost nonexistent. The related literature review exposes that there is little data on this subject. Additionally, the current data in the literature about the instructional technology use mostly consists of numbers (computer student ratio, internet connection to classroom ratio, etc). The research to determine the effect of elementary school teachers' change styles on their instructional use of

technology in the classrooms is needed. This study may provide some much needed research data in this field. It is the hope of the researcher that in the future, there will be more research studies in this field to investigate, analyze and understand the effect of teachers' change styles on their use of instructional technology in the classroom. As Fullan (2007) indicated, the real change must start at the individual teacher level in the classroom for the effective and efficient utilization of computer and information technologies. From this point of view, understanding the change styles of teachers and its effects on the instructional technology use are critical research subjects to be focused on now and also in the future.

This study provides an understanding of the effect of change styles on instructional technology use by elementary school teachers. The study highlights the importance of understanding the teachers change styles in order to attain the desired teaching outcomes by integrating instructional technology into their teaching. The numeric data on the instructional technologies available in the classrooms is not enough to understand why some teachers embrace technology and why some refuse to integrate them into their teaching. A deeper understanding of the effect of change styles on instructional technology use by teachers could be most helpful in using these technologies effectively and efficiently. Based on the change styles and instructional technology use of teachers, more effective and efficient professional development programs can be developed. Colleges and universities can prepare the future teachers by considering the effect of change styles on their instructional technology use. School principals and policy makers can make better decisions about the instructional technologies to be used in the elementary school classrooms to achieve curriculum

objectives when they have a better understanding of the effect of change styles on their teachers' instructional technology use in the classrooms.

Method

This was a causal-comparative study since it focused on the already existing conditions (change styles, gender, and teaching experience of teachers and their technology use). The independent variables of the study were change style, gender and teaching experience; and the dependent variable was technology use. The nature of the research variables determined the selection of the research method and design. The causal-comparative research was the most appropriate research method for the purpose of this study. The researcher investigated the effect of change styles on instructional technology use by elementary school teachers in a classroom setting. The sample group of the current study consisted of 81 elementary school teachers from the School District in Florida. The participation in the study was strictly voluntary and participants were able to withdraw from participating at any stage of the study. All participants were asked to complete the on-line surveys disseminated through the web-based tool on the Survey Monkey. The following three surveys were used to collect data from the participating elementary school teachers. These surveys were combined into a single survey and hosted on Survey Monkey, an on-line survey website:

(1) The Background Questionnaire (Appendix C)

(2) The Change Style Indicator survey (Appendix A)

(3) The Teachers' Technology Use survey (Appendix B)

The researcher developed a short Background Questionnaire to collect demographic information based on the research questions and hypotheses. The

questionnaire consists of four questions to determine participants' gender, teaching

experience, school district where they teach, and if they are elementary school teachers.

The Change Style Indicator is a 22-item survey, which was used to determine the

change style of the study participants. It is designed to measure an individual's

preferences in understanding change and in dealing with situations involving change

(Musselwhite, 1995). Based on the results of the Change Style Indicator instrument, an

individual is placed on a continuum ranging from a conserver orientation to an originator

orientation. Even though there were other research instruments available to be used to

measure teachers' change styles, the Change Style Indicator was the most appropriate

instrument for the purpose of this study.

The Teacher Technology Use survey is a 32-item self-rating scale. The possible

range of scores for each participant is between 32 and 160. The purpose of this

instrument is to measure teachers' performance indicators in technology use in the

classrooms (Parshall, Harmes, Jones, & Rendina-Gobioff , 2004). National and state

technology standards were the basis for the performance indicators. These technology use

indicators were reviewed online by technology supervisors and classroom teachers for

verification purposes. Even though there were other research instruments available to be

used to measure teachers' technology use, the Teacher Technology Use survey was the

most appropriate instrument for the purpose of this study.

Limitations

The general limitations of the study were as follows:

1. Findings of this study may not be generalizable to other elementary school

   teachers.

2. There were other variables not included in this study, which may have effected the participants' technology use.

3. This sample group of the study was taken from a School District in Florida. The results of the study may not be generalizable for other school districts.

4. This study utilized the Technology Use Survey to determine teachers' instructional use of computer and information technologies in a classroom setting. If other technology use surveys are used replicating this study, the results may not be the same as the results of this study.

5. This study utilized the Change Style Indicator to determine the change style of the teachers. If other change style surveys are used replicating this study, the results may not be the same as the results of this study.

6. The school district from where the sample group was selected for this study may not be representative of other school districts in many aspects including: terms of professional development provided to teachers, availability of instructional technologies and administrative and technical support.

Despite these limitations, this study does provide some useful insights into the effect of change styles on instructional technology use by elementary school teachers in a classroom setting. However, when drawing general conclusions about the effect of change styles on instructional technology use by teachers, these limitations should be taken into consideration.

Discussion of the Findings

The results of this study provide sufficient evidence that there is a difference in instructional technology use by elementary school teachers based on their change styles

in a classroom setting. In this section, the effect of change styles on instructional technology use by elementary school teachers is discussed. Furthermore, the more specific effects of change styles on instructional technology use by female, male, beginning and experienced elementary school teachers are also explored.

The Effect of Change Styles on Instructional Technology Use by Elementary School Teachers

The findings of this study revealed that the change styles of elementary school teachers effect their instructional technology use in a classroom setting. In other words, the instructional technology use by elementary school teachers in a classroom setting is significantly effected by the way they respond and manage changes around them. A one-way analysis of variance test found strong significant differences in the means of instructional technology use by elementary school teachers based on their change styles: $F (2, 78) = 14.332$, $p = .000$. Therefore, the null hypothesis was rejected which states that there is no difference in instructional technology use by elementary school teachers based on their change styles. The research participants in the originator change style group scored higher than the other two groups (pragmatists and conservatists) in using instructional technology for teaching in their classrooms. The participants in the pragmatists change style group scored higher than the participants in the conservatist change style group, but lower than the originators in the same category. The participants in the conservatits change style group scored the lowest in using instructional technology in a classroom setting. Post hoc Tukey HSD test conducted to check multiple comparisons of means of instructional technology use based on change style groups reported significant differences between the originator change style group and pragmatist

change style group; and between originator change style group and conservative change style group. Post hoc Tukey HSD test reported no significant differences of means of instructional technology use based on change styles between the pragmatist change style group and conservatist change style group.

The findings are consistent with the research that found significant differences in instructional technology use by elementary school teachers. In a research study conducted by Becker and Riel (2000), it is determined that there is a correlation between teachers' frequent use of instructional technology and student-centered constructivist teaching approaches in classrooms. They concluded that teachers' change process towards a student-centered teaching instruction requires them to use instructional technology often in their classrooms. The findings of the current study are also consistent with Evans-Andris' findings (1996) that reported three styles of computing among elementary school teachers: style of avoidance, integration style and technical specialization style. These styles are consistent with the three change styles and instructional technology use of participants in each style group of the current study. However, research findings by Wang (2002) contradict the results of the current study. Wang (2002) reported that there was no correlation between teachers' change to student-centered approach to classroom instruction and frequent computer use.

The Effect of Change Styles on Instructional Technology Use by Elementary School Teachers Based on Their Gender

This study investigated if there was a difference in instructional technology use by elementary school teachers based on their change styles and gender. Therefore, interaction effects were not investigated and factorial analysis was not employed. The

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effect of change styles on instructional technology use was analyzed within the change style groups of the same gender. The comparisons were not provided between female and male teachers regarding their technology use, because it was not the intention of this study.

The literature review on the instructional technology use by gender suggests conflicting findings (Teo, 2002). While the differences do not appear to be as great as some stereotypes might suggest, they offer insights that will be useful in instructional technology use (Rose, 2004). Research indicated that men are somewhat more informed than women about the way technologies work, but both men and women are in general agreement on the importance of being able to understand and use technology (Rose, 2004). A study conducted by Venkatesh and Morris (2003) about gender and instructional technology use showed that men were strongly influenced by their attitude toward using the new technology; women, on the other hand, were influenced by their subjective norm and perceived behavioral control.

Hong (2002) found no significant differences between male and female teachers in overall computer anxiety levels in his research of two hundred secondary school teachers. In their research on the influence of gender on computer use, Bain and Rice (2007) concluded that gender was not a significant factor. In their study, mean score of male's computer use was 30.03 and female's was 30.53.

In the following sections, female teachers and instructional technology use based on their change styles; and, male teachers and instructional technology use based on their change styles are discussed.

Female teachers and instructional technology use based on their change styles.

Among the 52 female elementary school teachers participated in the current study, 13 of them were originators, 19 of them were pragmatists and 19 were conservatists. A one-way analysis of variance test found no significant differences in the means of instructional technology use by female elementary school teachers based on their change styles: $F(2, 48) = 2.301$, $p = .111$. Therefore, there was not enough evidence to reject the null hypothesis, which states that there is no difference in instructional technology use by female elementary school teachers based on their change styles. Post hoc Tukey HSD test conducted to check multiple comparisons of means of instructional technology use by female elementary school teachers based on their change styles reported no significant differences between the originator, pragmatist and conservatist change style groups.

Although the results of this study revealed that there is no significant difference in instructional technology use by female elementary school teachers based on their change styles, the descriptive data provided some deeper understanding of instructional technology use by the change style groups of the female teachers. This data is exhibited in Table 10 on page 90. Based on the mean scores on Table 10, the originator female teachers use instructional technology more often than the pragmatist and conservatist female teachers. The mean score of originators was 88.00 compared to pragmatists, which was 78.63, and conservatists was 79.79 in instructional technology use. The findings by Ray et al. (1999) confirm the finding of the current study about the originator female teachers' use of instructional technology. Female originator teachers have a more positive view of instructional technology than the other two groups. They embrace

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technology and use it collaboratively, requiring their students to cooperate and share information among themselves and with others via the Internet.

The findings of the current study are consistent with research that found no differences in instructional technology use based on gender. Bain and Rice's study (2007) about the influence of gender on computer attitudes and uses of technology concluded that gender is not a significant factor in using technology. A study about the gender differences in computer technology conducted by Hale (2002), however, revealed that gender is a significant factor in computer technology achievement.

Male teachers and instructional technology use based on their change styles.

The findings of this study revealed that there is a significant difference in instructional technology use by male elementary school teachers based on their change styles. Among the 29 male elementary school teachers participated in the current study, 14 of them were originators, 8 of them were pragmatists and 7 were conservatists. On average, the originator male teachers scored 97.71 in instructional technology use. The pragmatist male teachers scored 80.75 and the conservatist male teachers scored 70.57.

A one-way analysis of variance test found strong significant differences in the means of instructional technology use by male elementary school teachers based on their change styles: $F_{(2, 26)} = 27.791$, p = .000. Therefore, the null hypothesis was rejected, which states that there is no difference in instructional technology use by male elementary school teachers based on their change styles. Post hoc Tukey HSD test conducted to check multiple comparisons of means of instructional technology use by male elementary school teachers based on their change styles reported significant differences between the originator, pragmatist and conservatist change style groups. The

mean difference between the originator male teachers and pragmatist male teachers is significant at the 0.05 level. Furthermore, the mean difference between the originator male teachers and the conservatist male teachers is significant at the 0.05 level. However, the mean difference between the pragmatist male teachers and the convervatist male teachers is not significant the 0.05 level. Even though the pragmatist male teachers have scored higher in instructional technology use on average than their conservatist counterparts, the difference was not significant at the 0.05 level.

These findings are consistent with the research that found males are more confident in using technology than the females in general (Bain & Rice, 2007; Teo, 2002). Having more confidence in an innovation or change may effect the change process of the implementer (Rogers, 2003) and may play a significant role in determining the change style. Teachers with more confidence in using instructional technology will tend to use instructional technology more often than the others and create student-centered approaches to instruction in their classrooms.

Within the current study, having 14 originator male teachers in a group of 29 may indicate that majority of male teachers have the change style to integrate instructional technology in their classroom instruction. It may be that male teachers are better at computing (Teo, 2002) and they find it easier to infuse technology in every aspect of their teaching. They also may feel that they are confident in using technology (Bain & Rice, 2007; Teo, 2002) and integrating it to their classroom teaching activities which may lead to more frequent use of instructional technology in their classrooms.

The Effect of Change Styles on Instructional Technology Use by Elementary School Teachers Based on Their Teaching Experience

This study investigated if there was a difference in instructional technology use by elementary school teachers based on their change styles and teaching experience. The results were analyzed based on the experience level of teachers: beginning elementary school teachers or experienced elementary school teachers. For the purpose of the current study, interaction effects were not investigated and factorial analysis was not employed. Therefore, the effect of change styles on instructional technology use was analyzed within the change style groups of the teaching experience level of participants (beginning or experienced). The comparisons were not provided between beginning and experienced elementary school teachers regarding their technology use, because it was not the intention of this study.

In the following sections, beginning elementary school teachers and instructional technology use based on their change styles; and, experienced elementary school teachers and instructional technology use based on their change styles are discussed.

Beginning elementary school teachers and instructional technology use based on their change styles.

A total of 12 experienced elementary school teachers participated in this study. Seven of those were in the originator change style group, 3 were in the pragmatist change style group and 2 were in the conservatist change style group. A one-way analysis of variance test found significant differences in the means of instructional technology use by beginning elementary school teachers based on their change styles: $F(2, 9) = 5.816$, $p = .024$. Therefore, the null hypothesis was rejected, which states that there is no difference

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in instructional technology use by beginning elementary school teachers based on their change styles. Post hoc Tukey HSD test conducted to check multiple comparisons of means of instructional technology use by beginning elementary school teachers based on their change styles reported significant differences between the originator and conservatist change style groups. The same test did not report any significant differences between the pragmatist and conservatist change style groups. Similarly, the Post hoc Tukey HSD test did not report any significant differences between the originator and pragmatist change style groups. The participating elementary school teachers who were in the originator change style group use instructional technology more of than the ones in convervatist change style group. The participants in the pragmatists change style group use instructional technology less often than the originators, but more often than the ones in the conservatist change style group. The participants in the conservatist change style group use instructional technology less often than both originators and pragmatists. However, the instructional technology use difference between the beginning originator teachers and beginning pragmatist teachers was not found significantly different. Even though the mean score of the originator was higher than the pragmatist teachers, this difference was not found significant. Compared to the beginning conservatist elementary school teachers, the pragmatist elementary school teachers had a higher average score in instructional technology use. The participants in the conservatist change style group of beginning teachers had the lowest level of instructional technology use compared to the participants of the other two (originators and pragmatists) change style groups.

These findings are consistent with research that found significant differences on instructional technology use by beginning elementary school teachers based on their

change styles. The National center for Education Statistics reported (2000) that teachers with fewer years of experience in teaching were more likely to use computer and information technologies in their classrooms than the teachers with more years of experience. Adams also discovered (2002) that the post-secondary faculty with 0-3 years of teaching experience use instructional technology significantly more often the faculty with 10 to 19 years of teaching experience.

The technology integration and use initiatives at the federal and state levels in recent decades may have an effect on why beginning or less experienced teachers use instructional technology more often than the ones with more experience in teaching. The Preparing Tomorrow's Teachers to Use Technology (PT3) initiative and the establishment of the National Technology Standards along with some other initiatives are focused on the preparation of new teachers to integrate instructional technology in their classrooms (Clausen, 2007). As a result of these types of initiatives, current teachers are being educated about integration instructional technology into classroom teaching activities more than their previous generations. The outcome reflects in the recent research results, which generally indicate that teachers with less teaching experience use instructional technology more than the experienced teachers (NCES, 2000; Adams, 2002).

Experienced elementary school teachers and instructional technology use based on their change styles.

A total of 68 experienced elementary school teachers participated in this study. Nineteen of those were in the originator change style group, 24 were in the pragmatist change style group and 24 were in the conservatist change style group. A one-way

analysis of variance test found significant differences in the means of instructional technology use by experienced elementary school teachers based on their change styles: $F(2, 65) = 10.019$, $p = .000$. Therefore, the null hypothesis was rejected, which states that there is no difference in instructional technology use by experienced elementary school teachers based on their change styles. Post hoc Tukey HSD test conducted to check multiple comparisons of means of instructional technology use by experienced elementary school teachers based on their change styles reported significant differences between the originator, pragmatist and conservatist change style groups. The experienced originator elementary school teachers use instructional technology in their classrooms more often than the pragmatist and conservatist elementary school teachers. The difference is significant at the 0.05 level. However, the instructional technology use difference between the experienced pragmatist teachers and conservatist teachers is not significant at the 0.05 level. Even though the mean score of the originator teachers' is .917 points higher than the pragmatist teachers' score, this difference is not found significant at 0.05 level.

These findings are consistent with research that found significant differences on instructional technology use by experienced elementary school teachers based on their change styles. The National Center for Education Statistics reported (2000) that teachers with more teaching experience use instructional technology less often than the ones with less teaching experience. The NCES report indicated that teachers with 20 years or more teaching experience used computers only 33% of the time; and, teachers with 4 to 9 years of teaching experience used computers 45% of the time.

Conclusions

The results of this study revealed that the effect of change styles on the instructional technology use by elementary school teachers in a classroom setting is a significant factor. In other words, elementary school teachers' use of instructional technology is determined by their change styles. Teachers in the originator change style group use instructional technology for teaching in their classrooms more often than the teachers in the pragmatist and conservatist change style groups. Teachers in the pragmatists change style group use instructional technology more often than the teachers in the conservatist change style group, but less often than the teachers in the originator change style group. Teachers in the conservatits change style group scored the lowest in using instructional technology in their classrooms compared to teachers in the originator and pragmatist change style groups.

The findings of a study conducted by Becker and Riel (2000) supports the findings of the current study. Becker and Riel (2000) determined that there is a correlation between teachers' frequent use of instructional technology and student-centered constructivist teaching approaches in classrooms. They concluded that teachers' change process towards a student-centered teaching instruction requires them to use instructional technology often in their classrooms. However, a study conducted by Wang (2002) contradicts the findings of the current study. Wang (2002) reported that there was no correlation between teachers' change to student-centered approach to classroom instruction and frequent computer use. The change styles of teachers were not a significant factor in instructional technology use in a classroom setting.

The findings of this study revealed that there was no significant difference in instructional technology use by female elementary school teachers based on their change styles. However, it is determined that the originator female teachers use instructional technology more often than the pragmatist and conservatist female teachers in their classrooms. The findings by Ray et al. (1999) confirm the finding of the current study about the originator female teachers' use of instructional technology.

The findings of this study revealed that there was a significant difference in instructional technology use by male elementary school teachers based on their change styles. A study conducted by Teo (2002) revealed that males have lower computer anxiety, more positive attitudes and in general better at computing. The results of the current study revealed that the originator male teachers use instructional technology more often than the pragmatist and conservatist male teachers in their classrooms. Teachers in the pragmatist change style group use instructional technology more often than the teachers in the conservatist change style group, but the difference was not statistically found significant.

This study revealed that there are significant differences in the means of instructional technology use by beginning elementary school teachers based on their change styles. Similarly, this study discovered that there are significant differences in the means of instructional technology use by experienced elementary school teachers based on their change styles.

Recommendations

Implications for Practice

The finding of this study is that there is a difference in instructional technology use by elementary school teachers based on their change styles. The results can provide current teachers and future teacher candidates, professional program developers for teacher education and training, school principals, administrators and policy makers with valuable information to be used in instructional technology utilization for classroom instruction.

Implications for current teachers and future teacher candidates.

The role of the elementary school teacher is evolving from that of a giver of information to that of a facilitator of student learning (Fullan, 2007). Teachers are challenged to use instructional technology in their classrooms to prepare students for the 21st century. Once teachers are aware of their own change styles, they may be able to deal with this challenge more successfully. Originator teachers will have little problem in using instructional technology in their classrooms. Pragmatist teachers may be challenged more than the originator teachers, but they may have the vision to overcome challenges related to instructional technology use. Conservatist teachers may have the most difficult task for them when dealing with the instructional technology use in their classrooms. They may need more time, resources and training compared to other change style groups.

The higher education and on-the-job training needs of each change style group of teachers are different. In addition, teachers' teaching strategies are different. Therefore, based on their change styles and teaching strategies, elementary school teachers may need different higher education programs and on-the-job training methods.

Implications for professional development.

Quality professional development programs are critical to teachers' effective use of instructional technology in their classrooms. In recent years, there is an effort to have the professional development programs focused on the effective and constructive implementation of instructional technology (Lawless & Pellegrino, 2007). Teacher change and student outcomes should be critical components of any training programs for teachers (Lawless & Pellegrino, 2007). This study will go a step further and suggest that teachers' change styles should be determined before they are offered any professional development programs. Considering the change styles of teachers (originators, pragmatists and conservatists), the training programs should address the need of each group based on their characteristics. An originator teacher does not need the same kind of training program as a conservatist teacher does.

Implications for school leaders.

School principals and administrators should identify the change style differences of the teachers and provide support and training to meet the unique needs of each group. Research has shown that principals may exhibit different leadership styles when it comes to change process. The three Change Facilitator Styles of school principals are the initiators, managers and responders (Hall, Rutherford, Hord, & Huling, 1984). Initiators have a strong sense of what their teachers need and support them to be successful instructional technology implementers in their schools. Managers are interested in getting the most out of the budgets, resources and keeping everything well organized. Responders take a back-seat when it comes to pushing their teachers and schools to be successful implementers of instructional technology. Hall, Rutherford & et al's research

(2010) indicates that in schools led by initiators and managers, teachers' instructional technology use frequency and effectiveness increases. Teachers whose principals are responders do not use instructional technology as often as the other teachers led by initiators and managers.

Further Research

This study focused on the effect of the change styles on the instructional technology use by elementary school teachers in a classroom setting. Today's advanced technologies allow students to learn anytime and anywhere; and, the same technologies also allow teachers to be present anytime and anywhere for their students. Further research is needed on the effect of change styles on the instructional technology use by elementary school teachers not only in the classrooms, but also outside of the classrooms.

Since interaction effects were not investigated for the purpose of this study, factorial analysis was not employed. A multiple-factor analysis of variance might provide deeper analysis of the effect of change styles on the instructional technology use by elementary school teachers. Hence, contributing to the results of this study and the broad literature on the same subject.

The current study focused on the instructional technology use as the dependent variable, and change style, gender and teaching experience as the independent variables. Further research on other variables (including educational background of teachers, self-efficacy, attitudes, professional training, availability of technology, leadership style of school leaders, school culture, etc.) may provide useful information on the same research questions and hypotheses.

The current study can be repeated by using other research instruments to measure teachers' instructional technology use and change styles.

A further study on the constraint of the current school classrooms to be technology driven student-centered teaching and learning environments would provide helpful information for the future of the classrooms. The question should focus on "what should classroom teaching and learning look like when all the components (technology, teachers, students, parents, local community and school administration) work together in harmony to achieve educational goals?"

Chapter Summary

This chapter reviewed the study and provided a summary of the findings. The purpose of this causal-comparative study was to investigate the effect of change styles on instructional technology use by elementary school teachers in a classroom setting. Furthermore, this study intended to investigate, analyze and understand the effect of gender and teaching experience on the instructional technology use by elementary school teachers based on their change styles in a classroom setting. The data collected from the 81 elementary school teachers in the School District in Florida. The research surveys were published on the Survey Monkey and participation was on a voluntary base. The analysis of variance (ANOVA) statistical test was used to compare all sample means simultaneously and to determine whether or not a statistical significance existed somewhere in the data. The findings of this study revealed that the change style of elementary school teachers does effect their instructional technology use in a classroom setting. In other words, the instructional technology use by elementary school teachers in a classroom setting is significantly effected by the way they respond and manage changes

around them. Although the overall results of this study revealed that there is no significant difference in instructional technology use by female elementary school teachers based on their change styles, there are some differences in the mean scores. Additionally, the findings of this study revealed that there was a significant difference in instructional technology use by male elementary school teachers based on their change styles. Similarly, the results of this study provided sufficient evidence that there was a significant difference in instructional technology use by beginning elementary school teachers based on their change styles; and, the findings also provided sufficient evidence that there was a difference in instructional technology use by experienced elementary school teachers based on their change styles.

Recommendations were discussed for further research to expand the knowledge of the effect of change styles on instructional technology use by elementary school teachers in a classroom setting. Implications for practice for teachers, professional program developers, school principals and administrators were also explored.

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LIST OF APPENDICES

Appendix A: Change Style Indicator Survey

Appendix B: Technology Use Survey

Appendix C: Background Questionnaire

Appendix D: Letter to School Principals

Appendix E: Request to Conduct Survey Research (for School Principals)

Appendix F: Memo to Contact Person

Appendix G: Letter to University B's Course Instructors

Appendix H: Cover Letter for Research Participants (Informed Consent Form)

Appendix I: Follow-Up E-Mail to School Principals and Assistant Principals

Appendix J: E-Mail to Contact Person from the Researcher

Appendix K: Follow-Up E-Mail to Contact Person from the Researcher

Appendix L: Follow Up E-Mail to Course Instructors from the Researcher

Appendix M: Recruitment Flyer

APPENDIX A
Change Style Survey

Instructions	**I find over a long period of time that:**

Distribute a **total of 3 points** to **each pair** of statements.
 	
Depending upon how strongly you agree with statement A or B, assign the statement 0, 1, 2, or 3 points.
 	
0= Almost never
1= Sometimes
2= Often
3= Almost always
 	
Remember, the total for **each pair** of statements must always equal to 3. Use only whole numbers, no fractions.
 	
Example:
 	
_2_ A. I honor tradition
_1_ B. I break with tradition
 	
Please respond as you think you are, **not** as you want to be.
 	
Thank you!
	1. ___ A. I am good at generating new ideas.
	    ___ B. I am good at building upon existing ideas.
	2. ___ A. I become bored easily with routine tasks.
	    ___ B. I can perform long detailed tasks without boredom.
	3. ___ A. I am good with details.
	    ___ B. I can see the big picture.
	4. ___ A. I like to work on practical problems.
	    ___ B. I like to work on theoretical problems.
	5. ___ A. I value originality.
	    ___ B. I value utility.
	6. ___ A. I prefer to follow the book.
	    ___ B. I prefer to make it up as I go.
	7. ___ A. I like to try new and untried solutions.
	    ___ B. I like to try practical solutions.
	8. ___ A. I prefer to work on one project at a time.
	    ___ B. I prefer to work on several projects simultaneously.
	9. ___ A. I produce many ideas, some of which may be unworkable.
	    ___ B. I produce a few relevant and proven ideas.
	10. ___ A. I believe policies should be challenged.
	    ___ B. I believe policies are to be followed.
	11. ___ A. I promote harmony in groups.
	    ___ B. I promote the sharing of different opinions in groups.
	12. ___ A. I bend the rules.
	    ___ B. I abide by the rules.
	13. ___ A. I seek familiarity.
	    ___ B. I seek adventure.
	14. ___ A. I complete projects in a roundabout way.
	    ___ B. I complete projects in a step-by-step fashion.
	15. ___ A. I like doing things in a familiar way.
	    ___ B. I like doing things differently each time.
	16. ___ A. I like to hand off a project once I know it can be done.
	    ___ B. I like to follow a project through to the end.
	17. ___ A. I prefer creating something new.
	    ___ B. I prefer improving upon something that already exists.
	18. ___ A. I appreciate tradition.
	    ___ B. I appreciate change.
	19. ___ A. I like working on cutting-edge issues.
	    ___ B. I like working on relevant day-to-day issues.
	20. ___ A. I make decisions based on actual fact.
	    ___ B. I make decisions based on my intuition.
	21. ___ A. I prefer written instructions.
	    ___ B. I prefer picture instructions.
	22. ___ A. I respond to situations in a measured way.
	    ___ B. I respond to situations spontaneously.
	
	The total for each PAIR of statements must equal 3.

Technology Use Survey

Listed below are modes in which computers may be used in the classroom. Please indicate how often you and your students use computers in each mode.

Key:　　1= not at all
　　　　2= once a month or less
　　　　3= once a week
　　　　4= several times a week
　　　　5= every day

1	My students use word processing as a writing tool	1 2 3 4 5
2	I use word processing for lesson plans, newsletters, and letters to parents	1 2 3 4 5
3	My students use spreadsheets to present mathematical concepts	1 2 3 4 5
4	I use spreadsheets to create charts and graphs for students	1 2 3 4 5
5	My students use e-mail or chats to gather information from experts	1 2 3 4 5
6	I use the Internet to participate in discussion groups for professional development	1 2 3 4 5
7	My students create electronic books on the computer using a variety of media, e.g. text, graphics, audio or video	1 2 3 4 5
8	I use digital images to create picture books for the students	1 2 3 4 5
9	My students use a variety of media to create electronic portfolios	1 2 3 4 5
10	I use the computer for classroom managements, e.g. seating charts, attendance, and assignments	1 2 3 4 5
11	My students create multimedia presentations using a variety of media	1 2 3 4 5
12	I use the presentation station to present student's work	1 2 3 4 5
13	My students use graphic organizers, e.g. Inspiration, to develop concept maps	1 2 3 4 5
14	I use graphic organizers to present concepts to the class	1 2 3 4 5
15	My students search for and evaluate information on the Internet	1 2 3 4 5
16	I search for and evaluate information on the Internet when I prepare my lessons	1 2 3 4 5
17	My students use authoring software to develop web pages	1 2 3 4 5
18	I create web pages for instruction	1 2 3 4 5
19	My students create desktop movies to communicate thoughts, ideas, and stories	1 2 3 4 5
20	I use multimedia presentations to introduce learning activities to students	1 2 3 4 5
21	Small group instruction	1 2 3 4 5
22	Individual instruction	1 2 3 4 5
23	Cooperative groups	1 2 3 4 5
24	As a reward	1 2 3 4 5
25	Independent learning	1 2 3 4 5
26	To tutor	1 2 3 4 5
27	To promote student-centered learning	1 2 3 4 5
28	As a research tool for students	1 2 3 4 5
29	As a problem solving/decision making tool	1 2 3 4 5
30	As a productivity tool (to create charts, reports or other products)	1 2 3 4 5
31	As a classroom presentation tool	1 2 3 4 5
32	As a communication tool (e.g., email, electronic discussion)	1 2 3 4 5

Background Questionnaire

Listed below are questions regarding your background related to the study. Please fill-in your school's name. On the questions, please just ***circle*** your selection.

1.   Are you currently teaching at an elementary school in Broward County, FL?

        1.   Yes
        2.   No

        If your answer is "no" to question number 1, please do not complete the rest of this survey. This survey is only for the elementary school teachers who are currently teaching in Broward County, FL.

2.   Do you use technology for teaching in your classroom?
        (Technology includes, but not limited to, computers and devices that can be attached to computers (e.g., LCD projector, interactive whiteboard, digital cameras); and computer software (e.g. interactive whiteboards, publishing, presentation and research software, Internet)

        1.   Yes
        2.   Sometimes
        3.   No

        If your answer is "no" to question number 2, please do not complete the rest of this survey. This survey is only for the elementary school teachers who use technology for teaching.

3.   How long have you been teaching?

        1. Less than three years
        2. Three years or more

4.   Gender:

        1. F
        2. M

THANK YOU!

APPENDIX D
BARRY UNIVERSITY
Cover Letter to School Principals

<School Name>
<Principal's Name>
<Address>

<Date>

Dear <Principal's Name>,

  Permission has been granted by the Institutional Review Boards of Broward County Public Schools and Barry University to conduct survey research in your school district. Your elementary school teachers' participation is requested in a study entitled, *The Effect of Change Styles on Instructional Technology Use of Elementary School Teachers.* The research is being conducted by Hasan Akyurekoglu, a doctoral student in the Educational Computing and Technology Department at Barry University. The purpose of this study is to investigate the effect of change styles on instructional technology use of elementary school teachers in a classroom setting. The study's findings may provide insights regarding the effect of elementary school teachers' change styles on their instructional use of technology in the classrooms. The anticipated minimum number of participants is 250 (from an estimated population of approximately 4700).

  You can assist in facilitating your teachers' participation in this study by doing the following:
- Identify the name of a <u>contact person</u> (not in a supervisory role) at your school site who will be able to receive and forward your elementary school teachers a cover letter (e-mailed by me, Hasan Akyurekoglu) to their school e-mail addresses;
- Complete and return the attached ***REQUEST TO CONDUCT SURVEY RESEARCH*** form in the addressed stamped envelope no later than <two weeks from the date of the letter>;
- Provide your contact person the attached <u>memo</u>, alerting him/her to expect contact from me via e-mail.

  Once the researcher receives the completed ***REQUEST TO CONDUCT SURVEY RESEARCH*** form indicating your permission, he will e-mail the contact person a copy of a cover letter to be forwarded to your teachers' school e-mail addresses. The teachers will be asked to access the on-line survey through an active link (contained in the cover letter) and complete the surveys (approximately 18 minutes in length) no later than <six weeks from the date of this letter>.

  Your consent to allow your teachers to participate in this research study is strictly voluntary. Should you decline to allow your teachers to participate, there will be no adverse effects to your administrative position or your school. Should your teachers decline to participate, there will be no adverse effects to their instructional positions. There are no known risks to you, your school, or your teachers in allowing them to

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participate in this study. Although there may be no direct benefit to you, your school, or your teachers, their participation may contribute to the field of education and the literature focusing on the instructional use of technology in elementary school classrooms.

As research participants, information your teachers provide will be kept anonymous; no names or other identifiers will be collected on their surveys. The teachers' Internet protocol (IP) addresses cannot be tracked. The researcher will print out the teachers' survey responses in order to obtain hard copies for data analysis procedures. The data will be kept in a locked file in the researcher's office for a minimum of five years and then destroyed thereafter. Survey data contained within the Internet survey database will be saved on storage media; data contained within the Internet database will then be deleted immediately thereafter. Data saved on the storage media will be retained for a minimum of five years and then deleted.

Data will be reported in the researcher's doctoral dissertation (available through Barry University's Main Campus Library and *Dissertation Abstracts*). A final report of the findings will also be provided (as required by the district's School Board) to Broward County Public Schools' IRB. Please be assured that you, your school site, and your teachers will not be identified when results are reported in order to maintain confidentiality.

If you have any questions or concerns regarding your teachers' participation in the study, you may contact me, Hasan Akyurekoglu, hakyur@gmail.com, or my cell number is (786) 473 7381. My supervisor is Dr. Joel Levine and his office number is (305) 899-3608, or the Institutional Review Board point of contact, Barbara Cook, at (305) 899-3020.

Thank you for your cooperation.

Sincerely,
Hasan Akyurekoglu

_____Elementary School
<Principal's Name>
<Address>

Please check one:

_____ YES, I allow my elementary level teachers to participate in a survey research study entitled, The Effect of Change Styles on Instructional Technology Use of Elementary School Teachers.

_____ NO, I do not want my school's t elementary level teachers to be involved in this research study.

- If you checked YES above, please provide the following information:

- Name of Contact Person (not in a supervisory role):
  _____

- Contact Person's e-mail address:
  _____

- Please indicate the exact number of elementary level teachers at your school:
  _____ teachers

- Please provide your signature as proof of permission granted by this school's principal allowing elementary level teachers to participate in completing an on-line survey:

_____ _____ _____
      Printed Name   Signature   Date

Please return this form in the addressed, stamped return envelope no later than **<two weeks from the letter's date>** to:

<div align="center">

Change Style Survey
c/o Hasan Akyurekoglu
20191 E. Country Club Drive, # WS-3
Aventura, FL 33180

</div>

APPENDIX F
Memo to Contact Person

<School Name>
<Address>

<Date>

Dear Contact Person:

Permission has been granted by the Institutional Review Boards of Broward County Public Schools and Barry University to conduct survey research in your school district. The participation of your school's elementary school teachers has been approved by your principal in a study entitled, *The Effect of Change Styles on Instructional Technology Use of Elementary School Teachers.* The research is being conducted by Hasan Akyurekoglu, a doctoral student in the Educational Computing and Technology Department at Barry University.

Your principal identified you as a contact person who will be able to:

- Receive a cover letter and a recruitment flyer e-mailed to you by the researcher, Hasan Akyurekoglu,
- Forward the cover letter and the recruitment flyer to all elementary school teachers' school e-mail addresses.

Please expect contact from me via an e-mail within the next several days so that I may provide you with these documents to be forwarded to the teachers' school e-mail addresses. Please forward the e-mail with the attachments as quickly as possible (within 1 to 2 business days), because teachers will have a limited time (two weeks) to complete the surveys. If you have any questions or concerns before then, you may contact me, Hasan Akyurekoglu, hakyur@gmail.com, or my cell number is (786) 473 7381. My supervisor is Dr. Joel Levine and his office number is (305) 899-3608, or the Institutional Review Board point of contact, Barbara Cook, at (305) 899-3020.

Thank you in advance for your cooperation.

Sincerely,
Hasan Akyurekoglu

BARRY UNIVERSITY
Cover Letter to Course Instructors

<Date>

Dear <Course Instructor's Name>,

Permission has been granted by the Institutional Review Boards of Broward County Public Schools and Barry University to conduct survey research in your school district. Your students' participation is requested in a study entitled, *The Effect of Change Styles on Instructional Technology Use of Elementary School Teachers.* The research is being conducted by Hasan Akyurekoglu, a doctoral student in the Educational Computing and Technology Department at Barry University. The purpose of this study is to investigate the effect of change styles on instructional technology use of elementary school teachers in a classroom setting. The study's findings may provide insights regarding the effect of elementary school teachers' change styles on their instructional use of technology in the classrooms. The anticipated minimum number of participants is 250 (from an estimated population of approximately 4700).

You can assist in facilitating your students' participation in this study by doing the following:

> ***Please expect an e-mail from me with a cover letter for your students attached to it. Please forward this e-mail to your students who are in graduate programs at Barry University.***

Your consent to assist in facilitating your students' participation in this study is strictly voluntary. Should you decline to provide assistance, there will be no adverse effects to your position or your school. There are no known risks to you, your school, or your students in allowing them to participate in this study. Although there may be no direct benefit to you, your school, or your teachers, their participation may contribute to the field of education and the literature focusing on the instructional use of technology in elementary school classrooms.

As research participants, information your students provide will be kept anonymous; no names or other identifiers will be collected on their surveys. The students' Internet protocol (IP) addresses cannot be tracked. The researcher will print out the teachers' survey responses in order to obtain hard copies for data analysis procedures. The data will be kept in a locked file in the researcher's office for a minimum of five years and then destroyed thereafter. Survey data contained within the Internet survey database will be saved on storage media; data contained within the Internet database will then be deleted immediately thereafter. Data saved on the storage media will be retained for a minimum of five years and then deleted.

Data will be reported in the researcher's doctoral dissertation (available through Barry University's Main Campus Library and *Dissertation Abstracts*). A final report of

the findings will also be provided (as required by the district's School Board) to Broward County Public Schools' IRB. Please be assured that you, your school site, and your teachers will not be identified when results are reported in order to maintain confidentiality.

If you have any questions or concerns regarding your teachers' participation in the study, you may contact me, Hasan Akyurekoglu, hakyur@gmail.com, or my cell number is (786) 473 7381. My supervisor is Dr. Joel Levine and his office number is (305) 899-3608, or the Institutional Review Board point of contact, Barbara Cook, at (305) 899-3020.

Thank you for your cooperation.

Sincerely,
Hasan Akyurekoglu

BARRY UNIVERSITY
Cover Letter For Participants
(Informed Consent Form)

Dear Research Participant,

Your participation in a research project is requested. The research being conducted by Hasan Akyurekoglu, a doctoral student in the Educational Technology and Computing (ECT) Program in the Adrian Dominican School of Education at Barry University. The purpose of this study is to investigate the effect of change styles on instructional technology use of elementary school teachers in a classroom setting. The study's findings may provide insights regarding the effect of elementary school teachers' change styles on their instructional use of technology in the classrooms. In accordance with this goal, an on-line survey will be used. The anticipated maximum number of participants is 210 (from an estimated population of approximately 4700).

If you decide to participate in this research, you will be asked to do the following:

- Click on the following active link – Take me to the Survey – to complete the survey on-line (approximately 15 to 18 minutes) no later than <insert date here>.
- Once you complete the survey, your responses will automatically be submitted to the researcher electronically.

Your consent to be a research participant for this study is strictly voluntary and should you decline to participate or should you drop out at any time during the study, there will be no adverse effects on your employment. There are no risks to you, as all information gathered by the researcher will be kept in strict confidence. Although there is no direct benefit to you, your participation will enable the researchers to gain valuable insight into the instructional use of educational technology in the elementary school classrooms.

As research participants, information you provide will be kept anonymous; no names or other identifiers will be collected on their surveys. Your Internet protocol (IP) addresses cannot be tracked. The researcher will print out the teachers' survey responses in order to obtain hard copies for data analysis procedures. The data will be kept in a locked file in the researcher's office for a minimum of five years and then destroyed thereafter. Survey data contained within the Internet survey database will be saved on storage media; data contained within the Internet database will then be deleted immediately thereafter. Data saved on the storage media will be retained for a minimum of five years and then deleted.

Data will be reported in the researcher's doctoral dissertation (available through Barry University's Main Campus Library and *Dissertation Abstracts*). A final report of the findings will also be provided (as required by the district's School Board) to Broward County Public Schools' IRB. Please be assured that you, your school site, and your principal will not be identified when results are reported in order to maintain

confidentiality. By completing and submitting the on-line survey, you have shown your agreement to participate in the study.

By completing and submitting this electronic survey you are acknowledging that you are at least 18-years-old and that you voluntarily agree to participate in the study.

If you have any questions or concerns regarding your teachers' participation in the study, you may contact me, Hasan Akyurekoglu, hakyur@gmail.com, or my cell number is (786) 473 7381. My supervisor is Dr. Joel Levine and his office number is (305) 899-3608, or the Institutional Review Board point of contact, Barbara Cook, at (305) 899-3020.

Thank you for your cooperation.

Sincerely,
Hasan Akyurekoglu

APPENDIX I
Follow-Up E-Mail to Principals and Assistant Principals

Dear <Principal's Name> and <Assistant Principal's Name>

Recently, a request form seeking your permission to allow your elementary school teachers to participate in a survey research study entitled, *The Effect of Change Styles on Instructional Technology Use of Elementary School Teachers*, (SBBC IRB File # <insert number here>) was mailed to you.

If you have already completed and returned the " Request to Conduct Survey Research" form, please accept my sincere thanks. If not, a copy of the form has been provided for you in an attachment to this e-mail.

I am especially grateful for your assistance. If you have any questions or concerns, feel free to contact me at hakyur@gmail.com, or my phone number is (786) 473 7381.

Sincerely,
Hasan Akyurekoglu

Dear <Contact Person's Name>

      As indicated in the memo you recently received, permission has been granted by the Institutional Review Boards of Broward County Public Schools and Barry University to conduct survey research in your school district. The participation of your school's elementary school teachers has been approved by your principal in a study entitled, The Effect of Change Styles on Instructional Technology Use of Elementary School Teachers. The research is being conducted by Hasan Akyurekoglu, a doctoral student in the Educational Computing and Technology Department at Barry University.

      Below you will find the attached copies of the cover letter and the recruitment flyer. Please forward these documents to the school e-mail addresses of elementary school teachers at your school site.

      If you have any questions or concerns before then, you may contact me, Hasan Akyurekoglu, hakyur@gmail.com, or my cell number is (786) 473 7381. My supervisor is Dr. Joel Levine and his office number is (305) 899-3608, or the Institutional Review Board point of contact, Barbara Cook, at (305) 899-3020.

      Thank you in advance for your cooperation.

Sincerely,
Hasan Akyurekoglu

APPENDIX K
Follow-Up E-Mail to Contact Person

Dear <Contact Person's Name>

As indicated in the memo you recently received, permission has been granted by the Institutional Review Boards of Broward County Public Schools and Barry University to conduct survey research in your school district. The participation of your school's elementary school teachers has been approved by your principal in a study entitled, The Effect of Change Styles on Instructional Technology Use of Elementary School Teachers. The research is being conducted by Hasan Akyurekoglu, a doctoral student in the Educational Computing and Technology Department at Barry University.

Below you will find the attached copies of the cover letter and the recruitment flyer. Please forward these documents to the school e-mail addresses of elementary school teachers at your school site.

*** This letter serves as a reminder for those teachers who may not have had a chance to complete the survey.

If you have any questions or concerns before then, you may contact me, Hasan Akyurekoglu, hakyur@gmail.com, or my cell number is (786) 473 7381. My supervisor is Dr. Joel Levine and his office number is (305) 899-3608, or the Institutional Review Board point of contact, Barbara Cook, at (305) 899-3020.

Thank you in advance for your cooperation.

Sincerely,
Hasan Akyurekoglu

APPENDIX L
Follow-Up E-Mail to Course Instructor

Dear <Course Instructor's Name>

      Permission has been granted by the Institutional Review Boards of Broward County Public Schools and Barry University to conduct survey research in graduate courses of Barry University. The study entitled, *The Effect of Change Styles on Instructional Technology Use of Elementary School Teachers,* is being conducted by Hasan Akyurekoglu, a doctoral student in the Educational Computing and Technology Department at Barry University.

      Below you will find the attached copies of the cover letter and the recruitment flyer. Please forward these documents to the e-mail addresses of your students in your class.

      *** This letter serves as a reminder for those students who may not have had a chance to complete the survey.

      If you have any questions or concerns before then, you may contact me, Hasan Akyurekoglu, hakyur@gmail.com, or my cell number is (786) 473 7381. My supervisor is Dr. Joel Levine and his office number is (305) 899-3608, or the Institutional Review Board point of contact, Barbara Cook, at (305) 899-3020.

      Thank you in advance for your cooperation.

Sincerely,
Hasan Akyurekoglu

Recruitment Flyer

Looking for Volunteers!

Participate in a Research Study!

➢ Do you know your change style?
➢ Do you know how it effects your technology use?

We invite you to be part of a ***doctoral research study*** at Barry University, focused on elementary school teachers' change styles and their instructional use of technology in the classroom!

Study Requirements for Participants:

➢ Completion of Change Style Survey (5-7 minutes)
➢ Technology Use Survey (10 to 11 minutes)

Eligibility Criteria:

➢ Must be an elementary school teacher
➢ Must be teaching in Broward County, FL (public or private elementary schools)
➢ Must use technology for teaching (Technology includes, but not limited to, computers and devices that can be attached to computers (e.g., LCD projector, interactive whiteboard, digital cameras); and computer software (e.g. interactive whiteboards, publishing, presentation and research software, Internet)

Special Notes:

Please put "Volunteer" on the subject line!!!

➢ Confidentiality will be carefully protected
➢ This study is FREE to all participants

Please Contact: Hasan Akyurekoglu (principal investigator)
                          (786) 473 7381
                          hakyur@gmail.com

Research Advisor: Dr. Joel Levine (Barry University), Phone # (305) 899-3608
                    E-mail: Jlevine@mail.barry.edu
Institutional Review Board Contact: Barbara Cook, Phone # (305) 899-3020.

THANK YOU!