AN ANALYSIS OF FACTORS THAT INFLUENCE SECONDARY SCIENCE TEACHERS IN AN URBAN SCHOOL DISTRICT IN SOUTH TEXAS TO REMAIN IN THE TEACHING PROFESSION

A Dissertation

by

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This dissertation meets the standards for scope and quality of
Texas A&M University-Corpus Christi and is hereby approved.

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ABSTRACT

This quantitative study is an examination of personal and professional factors that contribute to science teachers continuing to teach science in an urban area in South Texas despite the growing demands of the profession. This study examines why teachers in general leave the profession but also focuses on what factors influenced these teachers to stay. Personal retention factors measured included being an effective teacher and positive rapport with students. Professional retention factors included administrative support and adequate time to meet professional obligations.

There are 149 secondary science teachers in this large urban school district. Data was gathered from 109 of these educators to analyze personal and professional factors in regards to why these teachers remain in the field. For the purposes of this study a secondary science teacher is considered to be any teacher who teaches science in grades 6-12, which includes middle (6 through 8) and high school (9 through 12) in this area. The data for this quantitative study were collected by a paper survey (N=109) that was distributed at a professional learning session at the beginning of the school year. A Principal Component Analysis was run and followed by three multiple regression analyses of the pertinent components to determine if there is any relationship between the demographics of the participants and personal and professional factors that cause these teachers to remain in the field.

The results showed that professional factors like the amount of resources and the quality of those resources to assist teachers with job efficacy mattered as much as the personal factors such as positive teaching experience and an intrinsic sense of being an effective educator.

The results of this study will contribute to the literature regarding teacher education and theory that examines teacher practice affecting change. Further implications of this study include an exploration of Generalist certifications at the middle grades compared to content specific requirements at the high school level. Also an inquiry into whether or not the Bachelor's degree and teacher certification area affect their level of self-efficacy and job satisfaction in the field of science they have been assigned to teach.

DEDICATION

This work is dedicated to my son, Michael Ryan Montoya. Thank you for being the most amazing human being in the world. You are the reason for so many of the things that I do and although I am deeply sorry to have missed many moments in your life because of this work I hope the end result enriches our existence, helps you see the value in education, and enhances the development of your own set of high expectations for yourself every day of your life.

It is also dedicated to my mother, Jennifer Stephan. A woman that is much wiser and more patient than I can ever hope to be. To my father, Thomas Stephan, who is now and always will be the smartest man I know. And finally to my brother, Tom Stephan, thank you for being you. Words cannot express how much I love you all.

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Thank you to the late Panfilo Frank Montoya for providing the pathway to my first teaching job as a Carroll Tiger and a love-filled thank you to his amazing wife, Amparo for always being there for me and for Michael Ryan. Tremendous thanks to the late Bonnie Martin and to Tom Godbout for heightening my professional awareness as a rookie in the teachers' workroom by posing complex questions like "What tool do you think they used to cut the word gullible out of this dictionary?"

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Lauren, Brooke, and Joey for your patience during this important time in my life. I promise to be more fun from now on! In addition, I would like to thank the many people in whatever role you have played, whether positive or not, in my life along the way that have brought me to this exact moment.

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CHAPTER ONE: INTRODUCTION

The purpose of this study was to examine the personal and professional factors that contribute to secondary science teachers in an urban school district in South Texas remaining in the field. This study examined science teacher attrition in general but focused on what *is* working for these teachers that causes them to remain in the profession. Turnover of any teacher negatively impacts a campus, but the turnover of science teachers is an important and growing area of concern (National Academy of Sciences, 2007). The basis of the United States and the fundamental points of this country's prosperity are grounded in the scientific ventures and technological advancements made here (National Academy of Sciences, 2007). In the areas of education, healthcare, agriculture, transportation, national defense, and communications the advancements and collaborative developments are all based on the work of engineers and scientists (Stuessey, 2008). In order to operate as a worthy competitor in the global market having an educated, scientifically literate society is an asset worth investing in. Without competent science teachers working to educate the next generation to operate and succeed in the next decade, we not only lack a competitive edge in Science, Technology, Engineering, and Mathematics (STEM) but also risk becoming a nation of poorly informed decision makers (Steussey, 2008). The processes and concepts of science require a fundamental understanding of problem solving and scientific method (National Academy of Sciences, 2007). The vast body of literature regarding teacher preparation, attrition and retention prove that the impact of teachers on the quality of education is a critical factor in student achievement and their academic development (PRISE, 2010). Requirements of No Child Left Behind Act (NCLB, 2001), although designed to improve the quality of every educator in every classroom with its requirement that every teacher meet the requirements to

be classified as highly qualified, has not made the gains in the educational reform process projected (Ingersoll, 2003). Requiring that teachers exhibit a strong set of pedagogical skills and a strong mastery of their content has created more of a teacher shortage than experts predicted (Grissmer & Kirby, 1997). Teacher retirements, budgetary restrictions, and poorly designed teacher preparation programs that are not preparing their clientele are not the only reasons for the lack of qualified educators at this point (Sanders & Rivers, 1996). A major reason for the decline lies in the increase in teacher turnover in general (Darling-Hammond, 1999). One goal of this study was to see if there was a clear connection with job satisfaction and the demographic participating in the survey to contribute to this idea.

This work was fueled by the researchers previous experience as a Physics teacher, current position as an instructional leader responsible for the instructional program at a large urban high school, and as a citizen recognizing the need for students that are literate in science with an initial interest and the mental capacity to pursue those careers that science is a foundation for. This research could be the springboard for designing induction programs that can assist new science teachers in minimizing their learning curve.

A key reason this is an important topic to analyze is suggested by Billingsley (1993) when she states that a thorough analysis of teacher beliefs and classroom perceptions are helpful tools for the improvement of teacher training and overall classroom practice. “Both are areas that cause teachers to stay in the profession (Billingsley, 1993). Another reason this is valuable is that this can be a source for teacher educators and campus administrators to put theory into practice with their teachers to affect change. Educational theory is not highly regarded in academic circles and the proponents of that theory are often considered “poorly informed thinkers” (Griffith, 2008). More practical insight into the habits of teaching

professionals that remain in the field will help "set that straight and to give voice to the praxis of what happens when we teach and learn" (Griffith, 2008, p25) and will inform the practice of teacher educators and researchers in developing and implementing quality secondary science teacher education programs. There is a gap in the literature for science teachers in this area, therefore this work can add to the existing work on science teacher development and can identifying their professional habits and practices that have kept teachers in this area in the profession.

As a core content area in the high school curriculum, science is a subject that had continuing issues with teacher retention (Clotfelter, C., Glennie, E., Ladd, H., & Vigdor, J., 2008). Regardless of the reason behind teacher turnover, the replacement of science teachers is an issue that effects student achievement in the classroom. From 1996 to 2002, research done by the Texas Education Agency (TEA, 2002) showed that 1,536 science teachers left the profession compared to 2,504 teachers leaving in 2002. During the 2008 school year, 84% of science teachers remained in the profession. The other 16% of science teachers left their existing positions for another campus or left teaching altogether (Aud et al., 2011). One goal of this work is to cite areas that district and campus instructional leaders can use to improve retention rates which will enhance recruitment rates. Urban school settings often pose additional obstacles for classroom teachers, such as students of poverty and low parental involvement that cause higher turnover rates than other school settings (Ingersoll & May, 2012). This work may help address that issue for this school district and perhaps others with a similar demographic, setting, and situation.

An explanation of the purpose of the study follows. Four research questions that have guided the work are presented followed by the definition of the terms that are important to the

study in order to establish a common understanding of concepts presented in this work. The chapter continues with the significance of the study and its delimitations. The chapter concludes with the final section that summarizes the contents and organizational outline that will comprise this dissertation.

Statement of the Problem

An important facet for this study is the future need for jobs that will require a foundation in scientific training. Occupations and industries in the field of healthcare and construction science are projected "to experience the fastest job growth over the coming decade, as an aging population and expanding health insurance coverage change the preferences of consumers and a resurging housing market spurs long-awaited recovery in construction" according to the US Bureau of Labor Statistics' projections for workforce trends through the year 2022 (Bureau of Labor Statistics, 2014). Our workforce will be required to have technical training to meet the demands of this trend in providing service rather than tangible goods.

The National Science Foundation (2012) also reports that there are approximately 2.5 million unfilled positions in the Science, Technology, Engineering and Mathematics (STEM) areas of the work force. The Department of Commerce indicates a rapid rate of growth in the past 10 years for STEM jobs compared to non-STEM jobs (Langdon et al., 2011). According to Georgetown University Center on Education and the Workforce (2013) 60% of jobs in the United States are predicted to require some form of postsecondary education by the end of the decade. The U.S. Department of Labor reports that three million job openings every month have been noted since February 2011 because of the lack of skilled applicants in the field of science (Woellert, 2012). These predictions of the need for scientifically literate high school

graduates requires more than ensuring high school curriculums that are rich in scientific literacy (Conley, 2010). High schools will need to prepare students for the rigor and relevance of college or vocational studies required at the postsecondary level which means that secondary science teachers must be properly equipped themselves for the task ahead (Association of Public and Land Grant Universities, 2013). Public schools will need highly qualified science teachers that understand their role in developing their students' cognitive abilities (National Center for Education Statistics, 2011). Finding qualified science teachers that are able to deliver quality instruction and will remain committed to the profession is the dilemma then for school districts (NCES, 2011). In the region of South Texas in which this study takes place the additional lure of the oil field and the higher pay could be an additional obstacle for finding and retaining quality science teachers.

Purpose of the Study

This study was inspired by an existing study regarding Career and Technical teachers in Georgia. (Morris, 2006). This study was designed to identify the factors that influence secondary science teachers in an urban school district in South Texas to remain in the profession. It included a comprehensive look at personal factors that influence science teacher retention as well as professional factors that influence the secondary science teachers that participated in this study to remain in their field. The data collected for analysis was based on teachers' responses to a survey. The survey used is an existing document used in the research project for Career and Technical Education teachers (Morris, 2006) examining these questions regarding their choices to remain in the CTE field of education. Data for the analysis consist of science teachers' responses regarding the degree to which these factors contributed to their decisions to remain in their positions as secondary science teachers. This study also examines

the relationship between personal and professional factors influencing science teacher retention in relation to the demographic of those surveyed. And although there is a significant body of literature concerning teacher retention in general, there is very little work done in this area of the country focusing on this demographic and the science teachers that serve this population in this area of South Texas.

Research Questions

The following research questions guided this research with the secondary science teachers surveyed.

1. What are the personal factors that influence secondary science teachers to remain in the teaching profession?
2. What are the professional factors that influence secondary science teachers to remain in the teaching profession?
3. What is the relationship between the demographic profile and the personal factors?
4. What is the relationship between the demographic profile and the professional factors?

Definition of Terms

The following terms are defined to clarify important concepts to assist the reader in understanding this dissertation work:

Attrition – Teachers leaving their teaching current positions; includes teachers who leave the profession completely (Billinglsey, 1993).

High school – For the purpose of this study it is a school with a maximum grade of 12 and a minimum grade of 9.

Induction program – The intent of a teacher induction program is to provide a systematic structure of support for beginning teachers. A comprehensive induction program may include components such as new teacher orientation, mentoring relationships, support teams, workshops and training, workshops and training for mentors, and timely feedback on all aspects of teaching (Ingersoll & Smith, 2004).

Job satisfaction-For this study this refers to the attitudes and feelings that professionals have regarding their daily work and productivity levels (Brunetti, 2001).

Leadership in the Profession-refers to the teacher as a leader in the classroom, on the campus and in the community as an advocate for improved instructional practice and overall student achievement.

Middle school – For the purposes of this study it is a public school with a maximum grade of 8 and a minimum grade of 6.

Pedagogy-Is the art and science of teaching (Smith, 2012) and encompasses a teacher‘s skill set in explaining content concepts to students that requires expertise in the material and a knowledge of students and classroom context (Shulman, 1986).

Public School-Schools funded and managed by a governmental authority.

Recognition and Support-refers to validation of successful professional practices and the collaboration of teacher colleagues, administrators and other school community stakeholders in raising student success levels.

Secondary Science Teachers-certified teachers that teach science content in grades 6 through grades 12.

Teacher Retention-Refers to the teachers who continue to teach at the same school from one year to the next. (Billingsley, 1993).

Teacher Turnover – For the purposes this study, turnover is synonymous with attrition.

Urban schools –For the purposes of this study this district is considered:

> **Other Central City** (a) it is not contiguous to a major urban district; (b) it is located in a county with a population of between 100,000 and 774,999; and (c) its enrollment is the largest in the county or at least 75 percent of the largest district enrollment in the county.

Significance of the Study

The pedagogy of science instruction and the learning that follows solid pedagogical practice has become crucial not only for the well-being of the citizens but also for the advancement of socio-political, economic, technological and knowledge-based development of the society as a whole (Masheng, 2004The implication is that effective teaching of scientific content depends on the clear understanding of the meaning and nature of science from the teacher (Modelbu, 2013).

The teacher remains the major factor in the quality of education students receive in the study of science (Modelbu, 2013). The expectation of new educators including those that teach science is that they will perform their expected teaching duties at a level that is comparable to their colleagues around them (Ingersoll, 2012). Science teachers cannot produce scientific thinkers that are of higher quality than the teachers themselves are (Modelbu, 2013). The importance of science education in meeting the demands of science, technology, engineering and mathematics (STEM) programs to improve effective and sustainable development in those fields cannot be overemphasized (Nathan et al, 2010).

Solid science education programs implemented in secondary schools that are designed and delivered by highly qualified and committed science teachers will assist in the preparation

of students for those science careers projected for our future (Siemsen, 2013).. Careers in scientific research will be increasing in demand as new technology continues to allow for breakthroughs in the medical field, in manufacturing, and in transportation (Hatch, 2012). There will be an increasing demand for a work force educated in the fields of biology, chemistry, math, and engineering (Hatch, 2012). The Bureau of Labor Statistics (BLS) also forecasts a need for optometrists, nurses, audiologists, respiratory therapists, physical therapists, and dentists as a result of the aging baby boomers (Bureau of Labor Statistics, 2014). The BLS predicts a 36% increase in the need for veterinarians by 2020 which is a field that heavily relies on science as its foundational pathway of study (Bureau of Labor Statistics, 2014). In terms of non-medical fields, the BLS has predicted an increase in the need for specialists in Environmental and conservation science to design "greener" systems to assist in sustaining an ever growing global population. With advances in medicine life expectancies have increased substantially and the growth of our world population will create significant strains on our infrastructure. As the need for "green energy" increases, those that are specialists in the field will need to design efficient ways to regulate temperatures for personal and professional dwellings as well as those areas in the field that will require expertise that have not even been developed yet (Hatch, 2012). This means that students that pursue degrees at the postsecondary level in science and technology will have an increased opportunity to find jobs that produce economic stability (Bureau of Labor Statistics, 2014). Those students that pursue postsecondary degrees in science and technology are likely to obtain employment and achieve economic security in the future (Bureau of Labor Statistics, 2014). Therefore it is crucial that access to effective science instruction be equal for all of our students in the public school system. Bainbridge and Lasley (2002), Biddle (2001), Heck (2007), and Ingersoll

(2001), observed that students living in poverty were more likely to receive failing grades, lower test scores, and to lag behind students from more affluent homes. Ellinwood (2011), Jensen (2005), and Ingersoll (2001) reported that they were twice as likely to have teachers with little or no experience. Public schools in urban areas that serve diverse student populations that are often poor, must be able to give high quality mathematics and science instruction to the students they serve (Gess-Newsome, 2001).. This is a necessary step in closing the gap in academic achievement and ultimately economic prosperity among the socioeconomic groups in this region (U.S. Department of Education, 2002). This study will highlight those key factors that can assist area school districts in recruitment and retention of science educators that can design, plan, and implement highly effective science instruction for the students in this area of the country. Linda Darling-Hammond (2012) has clearly described the crucial role that teachers play in school improvement as being the factor that can "tip the scale" one way or another. She goes on to state that "every aspect of school reform depends for its success on highly skilled teachers and principals, especially when the expectations of schools and the diversity of the student body increases."

The findings in this study will be useful to those interested in improving the induction, retention and support programs provided to the teachers in this area. Especially in the areas of South Texas that educate socioeconomic groups similar to those of the teachers reflected in this work. The connection between effective science instruction and effective teachers fuels the significance of this study. The analysis of personal and professional factors in this study will lead to the recruitment and retention strategies that may provide district and campus leaders with insight to continue or develop programs and processes to retain quality science educators. New educators, whether teaching is a first career or their second, may benefit from an

understanding of the personal and professional factors identified by their peers as promoting their retention. Those new to the profession who look at their current professional situation in comparison to the findings in this study can look for the necessary support they will need to be successful in the field. Local instructional leaders that develop and implement induction programs may be able to use the findings of this study to add to and ultimately improve their mentoring and teacher induction programs**.** Teacher mentors may be able to use these findings to develop their own efficacy in the mentoring process. An understanding of personal and professional factors that are affecting teachers' decisions to remain in the profession can be a guiding force for campus and district administrative teams in developing other ways to support and enhance the effectiveness of the structures in place for the staff they supervise. Professional learning options, leadership habits and practices, and the morale on a campus and within a district can be enhanced by a campus leader with the knowledge of the professional practices that keep teachers engaged, motivated and driven to succeed. Pre-service programs whether at the collegiate level or in a private alternative certification program, may benefit from the study's results when evaluated, designing and implementing their programs for science educators. The significance of this body of work will be to identify the personal and professional factors that contribute to retention. This knowledge will serve as a vehicle for improving the retention of science educators in these urban area schools, which can ultimately impact and improve the learning experiences of the students they teach. The long term effect will create student participation in seeking science careers after high school as a result of positive learning experiences in their secondary school environments.

Limitations of the Study

The analysis of the demographics in relation to the retention factors studied here can

only be generalized to the secondary science teachers in this area of South Texas in this large urban school district. There are many other retention and attrition factors that could have been added to the work but in order to make this study happen within the time frame allotted the choices were minimized. The body of research regarding teacher attrition and retention is extensive. Many of these studies look at factors such as teacher preparation pathways, induction program efficacy, and professional learning implications as factors that contribute to retention and attrition. This study focuses on the demographic of the secondary science teachers in this large school district in South Texas and why they stay committed to the profession when many of them have degrees that could take them into the more lucrative oil field business, refinery work, and other science oriented industries developing in this region.

This study does not include an in-depth analysis of pre-service training pathways, mentoring programs, or induction programs as a means of explain teacher choices to remain in the field. The research did not ask *how* the teachers that participated were certified. This study does not serve as a predictor for attrition rates for the demographic participating in this work. While the findings within this work might apply to other urban secondary schools, other secondary campuses not classified as urban, and other academic areas other than science, the purpose is to focus on the personal and professional influences that affect the teachers of this area to remain science teachers.

Chapter Outline

There will be five chapters in this dissertation. This section will thoroughly outline the contents of each chapter.

Chapter One summarizes the topic this study will address which is factors that influence secondary science teachers in an urban school district in South Texas to remain in the teaching

profession. This chapter contains the statement of the problem as it relates to the growing need for qualified science teachers to promote an increase of scientifically minded thinkers to meet the growing demands of our global pursuits in the field. This chapter highlights the need for secondary education to prepare students to be interested in science so they can move forward in the post-secondary phase of their education in areas of science. The research questions are presented in this chapter, the terms used frequently are defined for the reader, and the significance of the work and who might be impacted by the results is discussed. This chapter concludes with the limitations of the study and frames the scope of the work**.**

Chapter Two is a review of the literature that has influenced this study and is relevant to the work intended. The purpose of this chapter is to form a coherent sequence of topics that the researcher utilized to inform and develop the structure and purpose of this study. The role of science education in the public school system, science teaching and learning at the secondary level, the importance of a qualified and quality science teachers at the secondary level, pedagogical preparation of science teachers, and retention and attrition factors that affect science teachers. The first area of literature reviewed for this study is the importance of having a qualified, quality science teacher in the classroom. A wide range of studies including a historical look at secondary science education in the United States and specific to Texas, teacher attrition, teacher retention are also included. This provides a general context for reasons that teachers remain in the demanding profession without equally demanding compensation and whether or not the specific content taught is a major factor in why they remain science teachers. The rest of the literature reviewed pertains to the levels of pedagogical and content preparation work as a basis for success. The research for science teacher retention is minimal so a need to base attrition and retention on general education was

a necessary step in the research process.

Chapter Three is an explanation of the design of the study to address the research questions. This chapter will set forth the details of the participants, how the researcher will access the participants, and the survey instrument that will be used. This chapter also includes the rational for the methods that will be used, the data analysis piece, and how validity and reliability will be ensured. This chapter will end with a detailed description of the limitations of the study and how the limitations will affect the generalizability of the study.

Chapter Four will present the quantitative data through the lens of the research questions posed. The demographics of the participants will be presented followed by the quantitative data gathered from the survey. There will be an analysis of the data to illustrate whether there is an importance to those factors presented through the survey.

Chapter Five will begin by summarizing the purpose of the study. This chapter will outline the design of the study, a thorough discussion of the findings and how these findings add to the existing literature regarding science teachers in secondary schools. The research questions are the focus for the structure of this chapter along with the implications for teachers, campus and district leaders and others that impact the practical aspects of the profession. The researcher's recommendations for future research are made followed by a concluding statement summarizing the findings of the study through the lens of the researcher.

CHAPTER TWO: LITERATURE REVIEW

The purpose of this chapter is to form a coherent sequence of topics that the researcher utilized to inform and develop the structure and purpose of this study. The sections that have been developed to support the research and lead to a logical design of this work include the following: (1) The Role of Science Education in Public Education; (2) Science Teaching and Learning at the Secondary Level; (3) The Importance of a Qualified and Quality Science Teacher at the Secondary Level (4) Pedagogical Preparation of Science Teachers, and (5) Retention and Attrition Factors that include job satisfaction, support and recognition and leadership in the profession.

The Role of Science Education in Public Education

The idea of universal education for all is a cornerstone of American Democracy (Pinar, 2004). This dynamic institution has been criticized, idealized, and revamped and still remains a key factor in the future of the United States. In this country there is significant variation in the way that school systems are organized and financed although all public schools that receive federal funding are held under the same federal accountability system (Camoy, 2003). In general, schools are financed through taxes. There is no formal tuition to public schools in the school district in which this study was conducted. Public schools are not permitted to deny admission to students based on academic performance; students may be expelled for extreme and repeated disruptive conduct. Although the mandate of compulsory elementary as well as secondary school attendance for students in the United States was not put in place until prior to World War II (Folger & Nam, 1967). And this noble idea about compulsory education has not been without its concrete challenges in regards to educated all students whether they are willing participants or not (Folger & Nam, 1967).

The education system in the United States is approximately 400 years old and the first public secondary school opened in 1821 (Folger & Nam, 1967). For science education this means that the first 300 years the majority of American students received little or no formal science education. The emphasis on formal science education was nonexistent at the time. Consequently, there was little need for science educators as part of the mainstreamed education system.

Public schools in the United States are charged with diligently working to educate all students that walk through the doors of their school buildings (Wagoner, 2008). Trends from schools of choice to legislative requirements for increased efforts in bilingual education and standardized testing are the key topics of debate among community members, in government meetings and teacher workrooms. Each of these initiatives have goals that include increasing access for all students, increasing standards of quality, inspiring student innovation, and empowering our students with their own educational process (Levine, 2006). These lofty initiatives are very promising for improving the American education systems but each comes with consequences which makes teaching today increasingly complex (Mansheng, 2004). The expectations for teachers are not simply about their performance in the classroom and that of their students but the paper work and responsibilities that are not directly tied to instructional planning and implementation are greater than ever before (Ingersoll, 2000). Standardized testing is an additional issue and has an important role in the professional lives of many core content teachers (Camoy, 2013), including science. In terms of science educators, the increased efforts to inspire students to become educated in the sciences has been a welcome change from only focusing on mathematics and reading instruction but has brought with it an increased accountability for science teachers (Loughran, 2002). Since science has not been an

area of intense focus compared to math and reading there is a need to increase scientific literacy across the grade levels. A national study done by the National Assessment of Educational Progress (NAEP) sheds some light on the problem this has created for today's science educators:

> Only 14 percent of fourth-graders knew that it is easier to stay afloat in salt water than in fresh water and could explain why. Only 10 percent of eighth-graders knew why eating potato salad made with mayonnaise that has been left out in the sun could cause food poisoning and only 26 percent of twelfth-graders could figure out how to use a sieve, a magnet, water, and a filter to separate a mixture of steel pellets, copper pellets, iron filings, sand, and salt (p. 2).

Prior to the 1950s, teaching science in the secondary classroom was not specifically geared to active engagement and specific hand-on and minds-on instructional techniques (Ellis, 2003). Science class was discipline specific direct instruction, student note taking, rote memorization and then formal assessment was the common cycle of instructional practice (Ellis, 2003). Then a series of historical events began to reshape the educational system. Brown v Board of Education in Topeka (integration within the school system) , the Elementary and Secondary School Act of 1965 (advocating and supporting civil rights) , and the Cold War and The Space Race (ensuring our national safety along with competing for our place in a global society) all contributed to changing the focus of the national curriculum (Thatti, 2001). This series of events also correlated with 90% of Americans receiving a diploma or an equivalent from high school (Thatti, 2001).

The need for an increase in science teachers was also a consequence of the events of that part in the history of the United States (Darling-Hammond, 1999). This change in emphasis in

science education due to the series of historical events mentioned above was not the first time science instruction was made an important part of American curriculum (Deboer, 1991). But it was the first time the level of expectation was about authentic application for students rather than an intrinsic need to know (Applebee, 2007). Formal science instruction became part of the required curriculum in the classroom within the last 100 years (Deboer, 1991). The shift from a teacher centric direct instruction only approach, commonly referred to as "sit and get" by teachers, to a student centered inquiry based hands-on and minds-on approach began in the late 1980s (Deboer, 1991). Teaching science typically began in the middle school curriculum with grades six, seven and eight. Science at the elementary level was not common practice (DeBoer, 1991). It was not until the launch of Sputnik by was known as the Soviet Union at the time that consequent reform of the science education programs began. Deboer's work also cites the publication of Jerome Bruner's work in cognitive psychology (Debor, 1991) outlining the cognitive learning model that emphasizes a "spiral curriculum" that would need to included laboratory investigations that requires students to see the concepts, hear the concepts, do the concepts and discuss the concepts as a means of increasing concrete learning in the science classroom (Bruner, 1960). The idea of a spiraled curriculum and teaching science in a sequence that contributes to student levels of understanding appealed significantly to science instructional leaders and educators and began the curricular reform that increased the use of inquiry based learning through laboratory activities (Ainsworth, 2010). Increases in environmental studies outlining the impact of mankind on the planet's natural resources (McKeown-Ice, 2000) also began to draw attention to the need in the United States for increased reforms in science education and the standards and practices in the curriculum of our public schools (U.S. DOE, 1983; NSF, 1986). Environmental science became an active area of

scientific investigation in the 1960s and continued to grow well into the 1970s (McKeown-Ice, 2000). The growth within the field was driven by the need to analyze environmental problems and an increased public awareness of the technological and industrial impact on the environment. The early 1990s heralded the call for an increase in science instruction at the elementary level beginning as early as kindergarten to increase exposure to science concepts prior to the secondary level of instruction (Carin, 2001). National Assessment of Educational Progress (NAEP) offered the first national science assessment, in 1990. The 1990 NAEP assessed student performance in American schools in the areas of reading, mathematics, science, and writing (NAEP, 1990). The sample included more than 146,000 students who were 9, 13, or 17-years old or in grades 4, 8, 11, or 12. The assessment was developed using an integrated curriculum theory and led to an in depth analysis of current curriculum design for science education (NAEP, 1990). In 1996, the US National Academy of Sciences developed and published the National Science Education Standards (NRC, 1996). This body of work was in alignment with the development of the criteria of NAEP. The NSE Standards and the criteria published by NAEP developed what is used as the national curricular framework for the United States (Duschl et al., 2007). This framework is what has been commonly accepted and is used for state and national standardized assessments under NCLB (NCLB, 2002) such as the Texas Assessment of Knowledge and Skill (TAKS) exams and now the current State of Texas Assessment of Academic Readiness (STAAR) and the STAAR End of Course (EOC) exams (TEA, 2014).

Fundamentally the role of science education in secondary schools is to produce a scientifically literate society. It is designed to expose students to scientific knowledge and the process skills required to comprehend that knowledge that will be necessary to succeed for

future work in science and the professionals grounded in scientific work.

Science Teaching and Learning at the Secondary Level

For the purposes of this study the reference to "secondary" refers to grades 6 through grade 12. In the school district in this area of South Texas in which this study takes place these are middle school (6 through 8) and high school (9 through 12) grades. When considering the pedagogical practices for the age group this study encompasses, it is important to note the large span of cognitive development that occurs during these developmental years. In the state of Texas certifications are blocked into large sections that encompass these grade levels and age ranges (TEA, 2014). Teachers that choose to certify in this area must be prepared to teach within a multitude of settings and to a wide cognitively developed and perhaps under-developed audience. In terms of classroom management this proves to be much more complex than many teachers are professionally prepared to handle (Darling-Hammond, 2003).

A clear comprehension of the nature of science is a crucial component for teachers to possess in order to cultivate student interest in the sciences (Michaels & Bell, 2003). The ability of students to grasp the limitations of the scientific world will prepare them to be critical consumers, productive participants in legislative decisions about our environment and make them capable of viewing the products of today's technology and scientific developments through an educated and critical lens (McKeown-Ice, 2000).

Science is the intellectual and practical activity encompassing the systematic study of the structure and behavior of the physical and natural world through observation and experiment (Roseman & Koppal, 2008). It is a body of knowledge that is organized into concepts, theories, and laws (Modebelu & Kalu-Uche, 2013). Science is comprised of content knowledge and process skills. Content consists of life science, earth science, and physical science. Process skills

are the inquiry based skills presented by the American Association for the Advancement of Science (AAAS) that range from observing, and measuring to classifying, experimenting, and inferring from collected data (AAAS, 1993). Students must be able to understand where scientific facts come from, how the hypothesis, experiments, and conclusions are generated and what is considered reliable information and what is not (Carin & Bass, 2001).

In the state of Texas there is a requirement of 40% of instructional time in the classroom devoted to laboratory exercises (TEA, 2014). A laboratory investigation is specifically defined as an activity that requires students to gather and analyze data in the laboratory setting (TEA, 2014). This requirement is designed to increase the amount of hands-on , exploratory learning in the classroom in an effort to cement the learning with practical experience (Enyedy & Goldberg, 2004).

The Importance of a Qualified and Quality Science Teacher at the Secondary Level

Poor pedagogical practice has been blamed as a source of poor student performance in the sciences at the secondary level (Darling-Hammond, 2003). Effective instruction begins with a quality teacher (Heck, 2007). Teaching is an effective practice when students learn the material at a high cognitive level and are able to apply it in a variety of situations to demonstrate a clear understanding (Modebelu & Kalu-Uche, 2013). This effective instruction should be demonstrated by students during their development of conceptual understanding and critical thinking skills. It should ultimately lead to an incorporation of science to explain the everyday happenings in their own physical world.

Quality instructional practice is the ability of a teacher to transform information in to "pedagogically powerful" forms that draw on students' background knowledge (Urevbu, 2001). These classroom practices lead to authentic connections for students that cause

information to become meaningful and therefore a permanent part of students' knowledge base about the world around them.

Science instruction is commonly delivered as a theoretical rather than practical subject (Urevby, 2001). The amount of inquiry based learning has been significantly absent from common practice in our secondary schools. Time, safety, and funding can be blamed for this but often teachers are not secure in their own practical knowledge of the curricular concepts to allow for students to explore the content productively. Science as a simple descriptive exercise is inadequate for the material to be thoroughly grasped by students (Urevbu, 2001).

Over the last twenty years there have been multiple messages sent from the educational research realm about ensuring that a qualified, quality teacher is placed in every classroom (Darling-Hammond, 2003). The areas of need for this to happen include reforming teacher preparation programs, utilizing on the job professional learning, improving recruitment and retention practices, and ultimately improving teacher quality (Borman, 2008). These reports and the data that supports this idea come from organizations such as the National Commission on Excellence in Education (1983), the Holmes Group (1986) to the federal education legislation known as No Child Left Behind (NCLB). The difference between being taught by a qualified and capable teacher "can mean the difference between a full grade level of achievement in a single school year (Aud, 2011)."

One study purport's that a method of preventing teachers from disengaging from their profession is to help teachers avoid "plateauing" (Meister and Ahrens, 2011). This work reviews the pervasive issues that deplete the drive and enthusiasm over time that teachers need to perform the daily work that effective teaching requires. The concept of plateauing "describes the frustration and disillusionment some teachers may experience over the course

of their tenure in the classroom" (Meister and Ahrens, 2011, p35). It seems to occur most frequently in teachers that are in well-defined positions for four or more years (Milstein, 1989). Milstein (1989) goes on to discuss how the teaching profession is "front-loaded." The professional privileges and the comfortable working conditions do not increase with experience or time but instead everyone receives those benefits whether in the profession for one year or twenty (Henderson & Milstein, 1996).

Another study conducted showed that some teachers are able to combat the stagnation that time and experience might bring to the profession (Fessler & Christansen, 1992). These teachers were able to maintain a level of enthusiasm and eagerness for their work in the classroom. They proved to be avid participants in professional development offerings and were adept in implementing the new information into their classroom practice (Fessler & Christiansen, 1992).

The research conducted by Day and Gu (2009) reveals the practices and habits of mind shared by two veteran teachers in regards to their levels of motivation, commitment and resilience in their daily work. The study found that the self-perceptions and internal values along with a sense of self-efficacy had a strong connection to the state of their external environment.

The organization of the school environment, the ability to collaborate and glean positive insight from even the most negative experiences all contributed to their choice to remain educators. A sense of structure and support from the outside building for the work done inside the classroom was a key piece to the puzzle of their long term commitment to teaching. Day and Gu also found that teaching was more a sense of vocation rather than profession for these educators. Partnered with the right amount of administrative support and the autonomy to

teach their content as they deemed appropriate made the difference in their choices to remain teachers.

In the research conducted by Arthur Levine (2006), who was president of Columbia University's Teachers College at the time, found that only 40% of school principals believed teacher education schools were doing a very good job of preparing teachers. More importantly, the same study also found that 62% of teacher college graduates did not feel that their own teacher preparation program adequately prepared them for the realities of the classroom.

There are a variety of reasons why teachers choose to stay or choose to leave but several key research pieces emerged through a review of the existing literature on the topic. Support from administration, professional development, teacher autonomy, growing demands of the work and standardized testing were among the key issues discovered in the review of the existing body of literature.

Pedagogical Preparation as a Factor

A recent study indicates that teachers who do not receive a thorough course of pedagogical training have a higher likelihood of leaving the profession early (Ingersoll, 2012). The U.S. Department of Education has placed emphasis on the preparation of teachers in content knowledge and reduced the emphasis on pedagogical practices despite federal policy represented by the 2001 No Child Left Behind Act (NCLB) emphasizing both pedagogical expertise and content knowledge (Boe & Shin, 2007). These are continuing areas of debate and are major issue concerning how best to prepare a sufficient supply of highly qualified teachers (Ingersoll, 2012). In that study done by the U.S. Department of Education in 2002, it was reported that teacher preparation, whether traditional or an alternative certification route, was of little value in impacting student achievement (U.S. Department of Education, 2002). In

regards to creating qualified classroom teachers the report states "the best available research shows that solid verbal ability and content knowledge are what matter most. The report goes on to call for a reduction in pedagogical course work for pre-service teachers and to place the training emphasis on content knowledge.

To satisfy issues of staffing the route of alternative certification has grown to more than 40% over the last five years (Ingersoll, 2012). The alternative certification program allows college graduates without formal education training to obtain emergency certifications that allow for immediate unguided entry directly into the classroom (Borman & Dowling, 2008). This is an area of further exploration for this study concerning the success of teachers based on how they were trained in their pre-service years.

Retention and Attrition Factors

Because of the primary role that teaching plays in supporting student learning in the classroom, the single most important factor in student achievement is the quality of the teacher in that classroom (Marzano, 2003). The Texas Teaching Commission has outlined a plan designed to restructure a more effective means of retaining quality educators. Figure 1 show these steps which the report refers to as the "Teaching Continuum." The idea for the Commission is to look at the policy gaps within the continuum and address these issues to improve the overall process. According to the studies presented effective teachers produce increases in student achievement that are four times greater than the least effective teachers (Borman & Dowling, 2008). This same study shows that the impact of one poor quality teacher on the academic progress of a student is evident for at least the following three years (Borman & Dowling, 2008).

Job Satisfaction

Teacher performance and attitude, which directly aligns with student learning and achievement, is closely connected to job satisfaction (Ostroff, 1992). Teachers who are dissatisfied within the profession are not likely to produce quality lessons and deliver engaging instruction in the classroom (Baker & Smith, 1997). Teachers that are satisfied with their jobs tend to produce more in the classroom and yield better instructional results with their students. (Baker & Smith, 1997). Teacher turnover is an expensive problem that might be avoided to a greater extent with more focused and mindful induction and retention programs in place that cater to the needs of the teachers in that area (Darling-Hammond, 2001). One aspect of the data analysis in this study is design to investigate the connection between the demographics of the participants and their level of job satisfaction.

Recognition and Support

Researchers from a survey conducted by the Gordon S. Black Corporation reported that 23, 569 teachers throughout the United States cited that recognition of excellence in teaching was one of the key factors in their level of job satisfaction (Harris Interactive, 1999). The study goes on to further show that teacher recognition must produce outcomes that teachers find meaningful and will ultimately lead to improving student achievement. Among the outcomes from the study were recognition awards and public awareness of high quality teaching, innovative instructional practices, and awards for improvement in instructional practices for novice teachers (Harris Interactive, 1999).

Theory of worker motivation (Herzberg, 1966) in general indicates that there are two levels of motivators for employees. The two levels are ‘hygiene’ and ‘motivation.’ Each of these holds a different purpose for an employee. The ‘hygiene’ factors include monetary

compensation, relationships with co-workers, working conditions, competence of administration and policies and procedures of the organization. Although Herzberg notes that these do not ensure worker motivation to high degree he does state that these factors must be present for motivation to be part of their work ethic. The motivational factors he includes are achievement and support, autonomy, recognition, and advancement opportunities (Herzberg, 1966). Pertinent to this study are the factors that include recognition and support.

Maslow, another of the motivational theorist, created a "hierarchy of needs" in his theory of worker motivation. Initial needs include an adequate salary but pertinent to this study are the needs of a supportive group of colleagues (support) and obtaining a feeling of being needed (recognition). After the initial needs of people have been met the higher level needs are working toward excellence and self-actualization (Maslow, 1954). Maslow's work indicates that the higher level needs are esteem, recognition and self-actualization and can be pursued and met once the basics have been achieved (Maslow, 1954). Each of these motivational theorists found that recognition, encouragement and respect as motivational factors in improving productivity and self-efficacy. Another aspect of the data analysis in this study is designed to investigate the connection between the demographics of the participants and their need for recognition and support as a key factor in their retention influences. .

Leadership in the Profession

Teacher leadership is defined as the process by which teachers influence their colleagues, administrators, and other school community stakeholders to improve academic processes such as teaching and learning, with the intent of increased student achievement (Murphy, 2005).

Today, public education exists in a state of high accountability which causes teacher quality to be at the center of discussion, debate and reform policy (Ovando, 1996). Research that

focuses on the quality of educators and methods of improving overall instructional practices is much needed. The research around teacher quality and student achievement is promising and continues to strengthen the need for proper training and support for the next generation of educators (Blasé, 2006). The idea that the learning curve for the newest educators can be reduced by on the job training and effective teacher leaders on campus provides a promise of effective reform in public education (Murphy, 2005).

Teacher leaders within the school can be a key element in strengthening academic performance and the overall school culture and tone (Blasé, 2006). Leadership by teachers in the classroom environment lends itself to educational improvement at the instructional level (Larner, 2004). From participation in professional associations, to interaction with the students in the community, to developing their own potential for additional leadership opportunities are all key pieces that lead to an increased level of commitment and work ethic in the school climate (Murphy, 2005). One other aspect of the data analysis in this study is designed to investigate the connection between the demographics of the participants and the role leadership in the profession plays as a factor in their choice to remain in the profession.

Summary

The realities of public education, the effects of poverty and the attitudes and outcomes that often results from low socioeconomic status, can be quite overpowering for many teachers new to the profession and for veterans seeking new ways to teach a very different demographic than when they began their careers (Jensen, 2009). The challenges this teaching environment can cause are high levels of teacher absenteeism, higher rates of attrition, and teacher shortages in critical core academic areas (Biddle, 2001). Therefore, the intent of this study was to develop ideas and potentially spark conversations about ways to retain highly

effective secondary science educators and identify the factors that influence them to remain. Unless more attention is given to teacher retention, and why some educators are successful and persevere in even the most hard-to-staff schools, teacher attrition will continue to be a national concern (Jensen, 2009).

The purpose of this chapter was to form a coherent sequence of topics that the researcher utilized to inform and develop the structure and purpose of this study. The sections that have been developed to support the research and lead to a logical design of this work include the following: (1) The Role of Science Education in Public Education; (2) Science Teaching and Learning at the Secondary Level; (3) The Importance of a Qualified and Quality Science Teacher at the Secondary Level (4) Pedagogical Preparation of Science Teachers, and (5) Retention and Attrition Factors including job satisfaction, recognition and support, and leadership in the profession.

CHAPTER THREE: METHODS

This chapter details the appropriateness of the design, the research questions, participants, instrumentation, data collection, data analysis, and the reliability and validity of the instrument is presented. The purpose of this study was to analyze factors that contribute to the choice of secondary science teachers to remain science teachers in the urban school district in which this study took place. The factors were divided into those that are professional and those that are personal. The methods used for the purposes of this work are outlined including the researchers background as it is relevant to the work presented and the limitations of the study. The study was done in order to provide insight to district leadership about the secondary science teachers in this area to aid in development of induction programs and other methods to assist with retention efforts in this critical teaching area.

Purpose and the Context

The purpose of this study was to explore which of the personal and professional factors the participants attributed to their continued work in the field. This study also allowed the research to analyze the demographics of the science teachers in this school district as a means to gaining insight about who they are as science educators. Finding and retaining teachers that are well qualified and effective at implementing high quality instruction in the classroom is a challenge for all school districts (Borman & Dowling, 2008). This challenge is heightened in many urban areas in which large at-risk populations attend and is a national concern, especially in light of the "No Child Left Behind" federal legislation (Haberman, 2005). The overall intention of this study is to examine the factors that contribute to teachers choices to remain science educators in this area of the country and explore the predictors of job satisfaction, recognition and support, and leadership from this information. This knowledge

can guide the district instructional leaders in developing programs to encourage science teacher retention and in building capacity for the school district's future.

Design

This descriptive, quantitative study uses a correlation design through multiple regression analyses to examine factors influencing the secondary science teachers surveyed to remain in the their teaching field. Descriptive research is a basic method of research that examines the particular situation, as it is in its current state (Creswell, 2003). Descriptive research involves identification of aspects of a particular situation based on what is observed by the researcher. The correlation procedure within the study is intended to explore if there is a relationship between the criterion variable and the predictor variables (Balkin, 2008).

An existing survey developed by Dr. Sheila Ruhland in her 2001 study of a similar nature with Career and Technical Education teachers and used again in 2006 by Dr. Hope Morris to study educators in Georgia, was used to gather data from the secondary science teachers in the district. Surveys are used for gathering data to measure variables with multiple response categories, to investigate attitudes and opinions that are not readily observable, to describe attributes of a particular population (Creswell, 2002, Babbie, 2001). This quantitative research study will be conducted using a cross-sectional survey. Cross-sectional surveys are given at a specific time only once to a specific and pre-determined group of participants (Babbie, 2001). And although this type of survey only provides snapshot since the situation may provide differing results if another time-frame had been chosen to administer the survey, it was an effective way to gather the data, was relatively inexpensive and took very little time to conduct and can estimate prevalence of outcome of interest since the sample was taken from the whole population in this case.

A Principal Component Analysis was used to validate the survey and explore any emerging themes among the personal and professional question asked in the survey. Of the 22 questions on the survey, 14 usable questions remained and were narrowed into three components used for further analysis. The three components were Job Satisfaction, Recognition and Support, and Leadership.

Further analysis was done through a multiple regression process. Three predictive variables, years of experience, ethnicity and salary were used. These variables came from the demographic data collected in the survey. The intent was to explore the relationship of three predictive variables as they relate to each of the criterion (dependent variable) of this quantitative study which are job satisfaction, recognition and support, and leadership.

Population

The 109 participants for this study are secondary science teachers in a large urban school district in South Texas. This population includes teachers that teach physical sciences as well as earth science and the life sciences. The grade levels that they teach in vary from grades 6 through grade 12 from 21 different campuses across the school district.

The survey used in this study is called "Retention Influences of Secondary Science Teachers." Each question used in the survey used a Likert-type style response. The Likert-type responses included (1) *not important*, (2) *somewhat important*, (3) *very important*, and (4) *extremely important*. There were seven questions regarding the personal retention influences, fifteen questions regarding professional retention influences, and five questions to obtain demographic information from the participants. An item analysis of the survey questions will be shown in a table for clarity (See Table 1). This survey was adapted with permission from an existing survey for Career and Technical teachers in Georgia (Ruhland,

2001). This survey was also used in a 2006 study of Career and Technical Teachers in Georgia in reference to the same questions and a similar research inquiry. Permission was obtained to use any part of the instrument and adjust it to fit the needs of the researcher and the participants being surveyed (see Appendix A). Content evidence was established through the literature of teacher retention (see Table 1).

Data Analysis

Descriptive statistics were used to provide a summary of the responses as they are connected to the demographic portion of the survey. The responses are divided into two tables by personal factors and professional factors. A Principal component analysis (PCA) was run to reduce the data into three components based on three different emerging themes within the data. PCA is a variable-reduction technique that shares similarities to exploratory factor analysis (Dimitrov, 2009). Its aim is to reduce a larger set of variables into smaller sets referred to as principal components that account for most of the variance in the original variables. Conducting a PCA analysis was a method of clustering variables together that all loaded on the same component. In this study, the researcher analyzed how the variables loaded and selected the highest number if a variable loaded in more than one component. If one component only loaded on one variable, this was treated as an indication that this variable might not be related to the other variables in the data set and might be measuring some other construct (Dimitrov, 2009). Further analysis was done through a multiple regression process. A standard multiple regression allows the prediction of a criterion variable based on multiple predictor variables (Balkin, 2008). This method allows for determination of the overall variance explained of the model and what each of the predictors contributes to the total variance explained (Dimitrov, 2009). Three predictive variables, years of experience, ethnicity and salary were used. These variables came

from the demographic data collected in the survey. The intent was to explore the relationship of three predictive variables as they relate to each of the criterion of this quantitative study which are job satisfaction, recognition and support, and leadership. Statistical Package for the Social Sciences v22 (SPSS) was used for the data analysis.

Research Questions

The following research questions were examined in order to guide the research:

1. What are the professional factors that influence secondary science teachers to remain in the teaching profession?
2. What are the personal factors that influence secondary science teachers to remain in the teaching profession?
3. What is the relationship between the demographic profile and the professional factors?
4. What is the relationship between the demographic profile and the personal factors?

The Role of the Researcher

The existing survey was selected because it had been used with a degree of success in an earlier study (Morris, 2006) that inspired this body of work regarding secondary science teachers. The study used similar questions regarding Career and Technology teacher retention in the State of Georgia. The survey was selected based on the questions asked and the ease of use for the participants. The researcher sought participant involvement, collected, analyzed, and interpreted the data and developed conclusions based on appropriate research practices (Salkind, 2011; Green & Salkind, 2010).

The choice to utilize a quantitative approach by the researcher is grounded in the researcher's experience as a high school Physics teacher for ten years. This role in the education system has had a significant contribution to the frame of reference through which

this study will be conducted. The researcher's role as a secondary science instructional coach and then as an administrator in the role of a dean of instruction for a high school campus also frames the lens through which the work was selected and ultimately will be developed through the course of the study. The purpose of this study was to examine the perspectives of middle school and high school teachers in this region regarding the personal and professional factors that influence them to remain in the field. The instructional experiences as a high school Physics teacher and the leadership experiences as a district wide Science Instructional Coach and now high school Dean of Instruction have influenced the way the studied was conducted.

Participants

The population of participants for this study was limited to the largest school district in the region for access and fiscal reasons in addition to the intent of the researcher to gain knowledge about the conditions under which this groups of science educators operates and the causes for their choices to remain in the local education system. The intent of the study was to heighten awareness in school leadership regarding the factors that influence these teachers to remain in the local schools to serve the demographic of students of this area.

Data Collection

There have been many studies done over the last twenty years that have employed quantitative methods to investigate teacher job satisfaction, attrition rates, and retention rates (Billingsley, 2004). These studies have included large scale approaches like examining the many variables that are associated with teacher satisfaction which include job satisfaction, recognition and support of peers, administrators, parents and colleagues, as well as opportunities to develop leadership skills within the classroom, the campus and in the community (Brunetti, 2001). Studies have also included a focus on the specific factors that

influence their professional decisions and impact their personal lives and the resiliency of teachers in their chosen instructional level, content and area of instruction within the profession (Bobeck, 2002).

In order to gain access to as many of the science teachers and potential participants as possible the researcher provided the surveys to the participants at a professional learning session as a voluntary opportunity to share their insight with the researcher in an anonymous and secure method. Permission to use this specific time was sought from the Executive Director for Curriculum and Instruction and from the Director for Professional learning of the school district being used in this study.

The school district's Secondary Science Specialist and the Secondary Science Coaches presented the information sheet (see Appendix A) and the survey as an option at the first break in their professional development session. 149 surveys were distributed by the specialist for the secondary science teachers. Participants were then asked submit their unmarked completed surveys in a secure manila envelope that was collected by the instructional coaches in the session. The surveys were then hand delivered to the researcher at the end of the professional learning session that same day.

Survey Instrument

This study is informed by the work of previously published studies, dissertation work, and other articles related to the study of teacher job satisfaction, teacher retention, and teacher attrition. The personal and professional factors chosen for the study are based on those that have a research based association with retention rates.

The survey used in this study is the *Retention Influences of Secondary Science Teachers* (Appendix B). The survey is designed with a Likert-type scale ranging from one to

five. The responses included (1) *not important*, (2) *somewhat important*, (3) *very important*, and (4) *extremely important*. Seven of the questions are in regards to the personal factors that influence the participants and the remaining fifteen are regarding the professional factors that play a role in their choice to remain secondary science teachers. There is one open-ended question, and five questions designed to obtain the demographic information about the participants involved in the study. Table I shows a detailed analysis of the survey questions and the research related to each item. This survey is in a modified form from an existing survey from an earlier study (Ruhland, 2001). The researcher obtained written permission (Appendix C) to modify and use the survey instrument for the current study. Each item in the survey is based on literature of teacher attrition and retention therefore establishing the content validity of the instrument.

The primary factors addressed for the professional aspect are regarding professional development, administrative support and recognition, resources, salary, peer recognition and support, time to complete work, student success and parental support, mentoring programs, and availability of professional associations. The primary factors for the personal aspect are positive teaching experiences, inner sense of efficacy, positive student rapport, contacts with students in the community, suitable financial compensation, and acknowledgement of parents for the job done. The survey also includes demographic data. The study focuses on secondary science teachers therefore the questions are focused specifically to that discipline.

The data obtained through the survey was acquired through a paper- based survey on the day the professional learning session will be held for the science teachers. The first document the teachers received was the information sheet explaining the details of the survey and the role they would play in providing the data if they choose to do so. The first section of

the survey is about Retention Influences. The second part is specifically designed to obtain demographic information about the secondary science teachers that are participating in the study.

Table 1

Survey Question Item Analysis

Question	Survey Item	Research
1, 3	Years of experience	Madsen & Hancock, 2002; Knoblock &Whittington, 2003
1, 3	Age	Kaufman, 1992; Levesque et al., 2000; Brown, 1973
3	Ethnicity	Ruhland, (2001)
2	Subject Area	Kirby & LeBude, 1998; Crawford, 2000; Ruhland, (2001)
	Personal Factors	
1	Teaching Experience	Brunetti, 2001; Ruhland, 2001; Bobek, 2002; AARP, 2003;
4, 8	Classroom Efficacy	Brown, 1973
1, 4, 8	Student Rapport	Certo & Fox, 2002; Ruhland, 2001
13, 21	Financial Incentive	AARP, 2003;,Inman & Marlow, 2003;
	Professional Factors	
2, 9	Professional Learning	Kirby & LeBude, 1998
3, 4	Mentor Programs	McGlamery & Edick, 2004; Osgood, 2001;
5, 18	Administrative support	Wright, 1991, Crawford, 2000; Kerlin, 2003
7, 12, 17	Colleague Support	Inman & Marlow, 2004
9, 14	Job responsibilities	Brown, 1973; Kirby & LeBude, 1998; Ruhland, 2001
6, 10	Work environment	Simurda, 1994; Kirby & LeBude, 1998;Ruhland, 2001
11	Classroom Resources	Simurda, 1994; Kirby & LeBude, 1998
10, 18	Policies and Procedures	Kirby & LeBude, 1998; Heath-Camp & Camp, 1990
19, 20	Parent Involvement	Simurda (1994); Ruhland (2001)
10, 6	Teaching setting	Joerger & Bremer, 2001; Rojewski, 2002

Note: This table is adapted from Ruhland, 2001 and Morris, 2006

Limitations

This study was intended by the researcher to be the basis of future research projects in the field of education. On the basis that this is the dissertation required for the degree sought, there were many limitations, such as time, that limit the focus and depth to which the work was be done. This study was limited to a small amount of time over which many things can happen in the lives of educators. The researcher's own perceptions of the field as a former high school Physics teacher brought a degree of insight to the work done here. This may lead to a slight degree of bias based on the experiences. The population of participants is small but could be representative of the demographics in this region and the surrounding areas therefore it could be generalizable to the region.

Summary

This was a quantitative study, which used a cross-sectional survey for the purpose of data collection. The survey instrument used was entitled "Retention Influences of Secondary Science Teachers." A hard copy of the survey along with a detailed information sheet was provided to the secondary science teachers and explained their participation and the purpose of the work. The surveys were distributed and collected without the researcher present. Surveys were returned and tabulated by a third party. A descriptive analysis of the data provided by the secondary science teachers in this large urban school district was conducted, followed by a Principal Component Analysis and three multiple regressions to analyze the data.

CHAPTER FOUR: DATA ANALYSIS

Introduction

The purpose of this research was to analyze the personal and professional factors that influence secondary science teachers in a large urban school district in South Texas to remain science teachers. The survey instrument used was an existing survey used by Ruhland (2001) for a similar study analyzing similar factors for the Career and Technical Education (CTE) teachers' profession. Data gathered analyzed the demographics, personal factors and professional factors that impact the choice to remain in the science educations.

Research Questions

1. What are the professional factors that influence secondary science teachers to remain in the teaching profession?

2. What are the personal factors that influence secondary science teachers to remain in the teaching profession?

3. What is the relationship between the demographic profile and the professional factors?

4. What is the relationship between the demographic profile and the personal factors?

Participants

This quantitative research study was conducted using a paper-based anonymous survey given to 149 secondary science teachers in a large urban school district in South Texas. The participants were given the opportunity to be part of this study by filling out the survey at their leisure during a district wide professional learning session. The information sheet provided to the teachers and the facilitation of the process by the instructional coaches made it very clear

that this was voluntary and not required nor expected. The participants could choose not to participate by not answering the questions or not picking up and turning in a survey.

There were 149 potential participants involved in this study; 109 teachers chose to participate and filled the survey out. This yielded a 73.2% rate of response among the participants. Two of the surveys were removed for use in the data analysis portion since the information provided was incomplete or unclear.

Demographic Profile

A product of this research was to gain a deeper understanding of the demographic profile of the science educators that teach in this school district. In Part 2 of the survey, the five questions were designed to yield this information.

The experience range among the participants was quite varied from 0 years to 34 years; however, 18.3% of secondary science teachers had 20 years or more of experience. The wide variety of years of teaching science was comparable to the wide variety in the range of ages since it varied from 17.4% under age 30 to 7.34% in the 61 to 70 range. The data gathered showed that only 17.5 of the teachers that responded were under 30 and the largest age range of the science teachers that answered the survey were in the 31 to 40 range at 38%. Other highlights in the data gathered include that 38.5% of the teachers that responded were Hispanic when the Texas Education Agency reports that 79.3% of the students in this district are Hispanic; the majority of participants reported a current salary of over $46,000. All areas of science were represented by the participants that responded with more than 30% having multiple certifications and 29% having multiple levels of certification including elementary level.

Professional Retention Influences

The first research question examines the professional factors that influenced these participants to remain in the teaching field. The survey listed 15 professional retention factors. Table 2 displays each of these factors listed by question and includes the means and standard deviations for each question. Eleven of the fifteen had a mean of three or greater in the results. Support from administrators (M=3.66) was the most critical of the professional factors listed. Pleasant working conditions (M=3.61) was the next most important factor followed closely by adequate time to complete job responsibilities (M=3.56). Policies and procedures that support the teacher (M=3.47) followed very closely by potential for salary increases (M=3.46) was next in the results. The mean for these two factors was very close and reflected a high level of importance to the participants. Watching students grow intellectually (M=3.29) was very closely followed by support from parents (M=3.27). The other factors with a mean of 3 or greater were quality and quantity of resources available, recognition from administrators, recognition of and support by peers and professional development opportunities in that order.

The professional retention factors considered less important had means that ranged from 2.48 to 2.84. Availability of mentoring program, potential for leadership opportunities and participation in professional associations were in that range in that order. The professional factor that meant the least according to the responses teaching in a variety of settings (M=2.21).

Table 2

Descriptive Statistics for the Professional Retention Factors

Factor	N	Mean	SD
2. Professional development opportunities	109	3.06	.797
3. Participation in professional associations	109	2.55	.948
5. Availability of mentoring program	109	2.80	.779
6. Teach in a variety of settings	109	2.21	.924
7. Recognition of and support by peers	109	3.17	.855
9. Adequate time to complete job responsibilities	109	3.56	.700
10. Pleasant working conditions	109	3.61	.769
11. Quality and quantity of resources available	109	3.25	.973
12. Potential for leadership opportunities	109	2.58	.936
13. Potential for salary increases	109	3.46	.764
14. Policies/procedures that support the teacher	109	3.47	.740
17. Recognition from administrators	109	3.19	.751
18. Support from administrators	109	3.66	.710
19. Support of parents	109	3.27	.753
22. Watching student grow intellectually	109	3.29	.936

Personal Retention Influences

The second research question was in regards to the personal factors that influenced the secondary science teachers that participated in the survey to continue teaching science. There were seven personal retention factors in the survey and each is listed in order of the survey questions in Table 3. Six of the seven personal retention factors had a mean of 3 or greater. Only one of the seven factors was noted as only somewhat important.

Positive interaction with students (M=3.63) was the most important according to the survey responses. Seeing students comprehend the concepts being taught was second (M=3.54) followed by an inner sense of knowing that the science teacher is doing a good job (M=3.54) ranked third in the personal retention factors. The least important personal retention factor was contact with students in the community (M=2.50).

Table 3

Descriptive Statistics for the Personal Retention Factors

Factor	N	Mean	SD
1. Positive teaching experience	109	3.29	.936
4. Inner sense of knowing I'm doing a good job	109	3.47	.740
8. Positive interaction with students	109	3.63	.588
16. Seeing students comprehend the concepts being taught	109	3.54	.660
21. Satisfied with teaching salary	109	3.42	.628
15. Contact with students in the community	109	2.50	.949
20. Acknowledgment of support by parents for their child	109	3.22	.875

Demographics and Personal and Professional Retention Factors

A principal components analysis (PCA) was run on the 22-question survey that measured participants responses to personal and professional factors related to teaching. Table 4 shows the data. The suitability of PCA was assessed prior to analysis. Continued analysis of the correlation matrix showed that all variables had at least one correlation coefficient greater than 0.3. PCA revealed the top six components that had eigenvalues greater than four which explained 36%, 15%, 11%, 7.6%, 5% and 4.8% of the total variance, respectively. Review of the scree plot indicated that six components could be retained (Cattell, 1966). Additional analysis showed a three-component solution met the interpretability criterion. As such, three components were retained with a minimum of three variables loading on each component at .4 or higher (Cattell, 1966).

The interpretation of the data was consistent with the personal and professional attributes the survey was designed to measure with strong loadings of job satisfaction items on Component 1, recognition and support items on Component 2, leadership items on Component 3. Component loadings of the rotated solution are presented in Table 4. The sums of these components were created as three new variables in the data set. Further analysis was done through a multiple regression process. Three predictive variables, years of experience, ethnicity and salary were used. These variables came from the demographic data collected in the survey. The intent was to explore the relationship of three predictive variables as they relate to each of the criterion (dependent variable) of this quantitative study which are job satisfaction, recognition and support, and leadership. Statistical Package for the Social Sciences v22 (SPSS) was used for the data analysis.

Data Analysis

Three multiple regression analyses were conducted to predict the overall personal and professional factors that influence science teacher retention based on job satisfaction, recognition and support, and leadership according to the survey data collected. The predictors were years of experience teaching, ethnicity and salary, while the criterion variable was job satisfaction for the first analysis, recognition and support for the second analysis, and leadership. One analysis was done to predict the effects of years of experience, salary, and ethnicity on job satisfaction. The second analysis was done to predict the effect of years of experience, salary and ethnicity on levels of support and recognition as teachers. The third multiple regression analysis examined leadership and the correlation of years of experience, salary and ethnicity on levels of support and recognition.

Table 4

Rotated Component Matrix from Principal Component Analysis

	Component					
	1	**2**	**3**	4	5	6
Q1	**.742**	.275	.034	.355	.244	.129
Q2	-.149	.014	.352	.385	.443	-.440
Q3	.030	.015	**.978**	.125	.041	-.039
Q4	**.948**	.125	.024	.123	.005	.034
Q5	.138	.166	.064	.052	.743	.707
Q6	.200	.199	.028	.040	-.480	.403
Q7	.306	**.924**	.006	.032	.005	.069
Q8	.335	.295	.291	.722	.001	.005
Q9	.249	.044	.107	.295	.110	.108
Q10	.239	.206	-.074	.822	.200	.133
Q11	**.780**	.280	-.132	.165	.052	-.055
Q12	-.025	.054	**.923**	.095	.050	.077
Q13	**.940**	.138	.026	.112	-.029	.030
Q14	**.898**	.138	.019	.120	.037	.042
Q15	.020	.028	**.971**	.055	.038	-.076
Q16	.051	.215	.312	.298	.271	.767
Q17	.240	**.859**	.128	.122	-.028	-.044
Q18	.405	.115	.055	.175	.025	.386
Q19	.375	**.801**	.001	.022	.199	.194
Q20	.271	**.905**	.007	.043	.009	.067
Q21	-.271	**.685**	-.022	.138	.263	-.033
Q22	**.742**	.275	.034	.455	.244	.129

Table 5

Survey Questions and Component After Principal Component Analysis

Number	Question	Component
1	Positive teaching experience	Job Satisfaction
3	Participation in professional associations	Leadership
4	Inner sense of knowing I'm doing a good job	Job Satisfaction
7	Recognition of and support by peers	Recognition and Support
11	Quality and quantity of resources available	Job Satisfaction
12	Potential for leadership opportunities	Leadership
13	Potential for salary increases	Job Satisfaction
14	Policies/procedures that support	Job Satisfaction
15	Contact with students in the community	Leadership
17	Recognition from administrators	Recognition and Support
19	Support of parents	Recognition and Support
20	Acknowledgment of support by parents for their child	Recognition and Support
21	Satisfied with teaching salary	Recognition and Support
22	Watching student grow intellectually	Job Satisfaction

Demographics and Job Satisfaction

A multiple regression analysis was conducted on job satisfaction based on years of experience, ethnicity, and salary. Descriptive statistics are reported in Table 6. Job satisfaction scores were normally distributed. Standardized residuals were also normally distributed. Scatterplots were analyzed, and no curvilinear relationships between the criterion variable and the predictor variables or heteroscedascity were evident. These variables were not statistically significantly as predictor for job satisfaction according to the data, $F(3, 103) = 3.032$, $p = .033$. The sample multiple correlation coefficient was .285, $R^2 = .081$, and the adjusted $R^2 = .054$. Table 7 reflects the bivariate and partial correlations associated with this analysis.

Table 6

Descriptive Statistics for Multiple Regression for Job Satisfaction

	Mean	SD	N	Job Satisfaction	Years of Experience	Ethnicity	Salary
Job Satisfaction	3.37	.774	107	___	.180	.101	-.230
Years of Experience	10.2	8.90	107		___	.05	-.291
Ethnicity	.48	.502	107			---	.119
Salary	.47	.501	107				---

*p<.01

Table 7

Multiple Regression Results for Job Satisfaction

Predictor	B	SE B	β	*t*	*p*	sr^2	rs
Years of Experience	.010	.009	.112	1.13	.261	.011	.398
Ethnicity	.187	.147	.121	1.27	.207	.014	.241
Salary	-.327	.154	-.212	-2.12	.036	.040	.019

*p<.01

Demographics and Recognition and Support

A multiple regression analysis was conducted on job satisfaction based on years of experience, ethnicity, and salary. Descriptive statistics are reported in Table 8. Job satisfaction scores were normally distributed. Standardized residuals were also normally distributed. Scatterplots were analyzed, and no curvilinear relationships between the criterion variable and the predictor variables or heteroscedascity were evident. These variables were not statistically significantly as predictor for job satisfaction according to the data, $F(3, 103) = .659$, $p = .579$. The sample multiple correlation coefficient was .137, $R^2 = .019$, and the adjusted $R^2 = -.010$. Table 9 reflects the bivariate and partial correlations associated with this analysis.

Table 8

Descriptive Statistics for Multiple Regression for Recognition and Support

	Mean	SD	N	Recognition and Support	Years of Experience	Ethnicity	Salary
Recognition and Support	3.24	.677	107	___	.005	.011	-.132
Years of Experience	10.2	8.90	107		___	.048	-.291
Ethnicity	.48	.502	107			-----	.119
Salary	.47	.501	107				-----

*p<.01

Table 9

Multiple Regression Results for Recognition and Support

Predictor	B	SE B	β	*t*	*p*	sr^2	rs
Years of Experience	-.003	.008	-.038	-.368	.714	.001	.001
Ethnicity	.011	.133	.008	.079	.937	.000	.006
Salary	-.195	.139	-.144	-1.40	.164	.019	.928

*p<.01

Demographics and Leadership in the Profession

A multiple regression analysis was conducted on leadership scores based on years of experience, ethnicity, and salary. Descriptive statistics are reported in Table 10. Leadership scores were normally distributed. Standardized residuals were also normally distributed. Scatterplots were analyzed, and no curvilinear relationships between the criterion variable and the predictor variables or heteroscedascity were evident. There was a statistically significant relationship between years of experience, ethnicity, salary and leadership in the profession, $F(3, 103) = 5.602$, $p < .01$. A medium effect size was noted with approximately 14% of the variance accounted for in the model, $R^2 = .140$. Ethnicity was statistically significant predictor of leadership in the profession (see Table 11) uniquely accounting for approximately 12% of the variance. Nearly 83% of the predicted model was accounted for by ethnicity, *rs*=.83. Years of experience was not significant and only accounted for .9% of the variance. For years of experience, 6.7% of the predicted model was accounted, *rs*=.067. Salary was not significant and only accounted for 3.1% of the variance. For salary, 22% of the predicted model was accounted, *rs*=.218. Thus a single predictor, salary, has a small effect but is less meaningful when included in a model with ethnicity and years of experience. Power was sufficient for the study, $1\text{-}\beta > .99$; given the sample size of n=107, statistical significance would be detected for small effect sizes, $R^2 > .14$.

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Table 10

Descriptive Statistics for Multiple Regression for Leadership in the Profession

	Mean	SD	N	Leadership	Years of Experience	Ethnicity	Salary
Leadership	2.54	.920	107	___	-.097*	.341	-.175*
Years of Experience	10.2	8.90	107		___	.05	-.291*
Ethnicity	.48	.502	107			---	.119
Salary	.47	.501	107				---

*p<.01

Table 11

Multiple Regression Results for Leadership in the Profession

Predictor	B	SE B	β	*t*	*p*	sr^2	rs
Years of Experience	-.008	.010	-.081	-.843	.401	.009	.067
Ethnicity	.607	.169	.331	3.59	.001*	.116	.827
Salary	.205	.177	.112	1.16	.249	.031	.218

*p<.01

Summary

There are 149 secondary science teachers in this school surveyed. 109 chose to participate in the survey. Two surveys were removed because of conflicting or incomplete information regarding salary. The researcher could not resolve the issue due to the anonymity of the surveys so the surveys were removed from the data set. 69 of these science teachers teach at the middle school level which is grades 6 through 8 in this school district. 80 of the science teachers teach at the high school level which is grades 9 through 12. Data were gathered to examine the demographic profile and to conduct an analysis on the professional and personal retention factors that potentially contribute to their continued service in this profession.

This researcher's findings indicated that the top five professional retention factors were support from administrators, pleasant working conditions, adequate time to complete job responsibilities, policies and procedures that support the teacher, and the potential for salary increase. And although the statistical tests did not show a strong correlation to the demographics reported and those personal and professional factors reported, it was clear that the tendency for leadership in the profession strongly correlated to the minority representation. No differences were noted between the personal retention influences and the demographic categories age, ethnicity, and salary.

CHAPTER 5

SUMMARY, CONCLUSIONS, AND IMPLICATIONS

Summary

The research study was conducted for the purpose of examining the retention factors that influence a group of secondary science teachers in South Texas to remain in the profession. The survey used was modeled after an existing survey used by Ruhland (2001) in a similar study that posed the same questions to Career and Technical Education teachers. The survey was also used by Morrison (2010) in a study of Georgia's secondary career and technical education teachers.

The overarching research question addressed in this study was why does this group of secondary science teachers tend to remain in the teaching profession and is there a correlation between the demographics and their responses?

The research population was comprised of 149 participants as paper surveys were distributed to them at a professional learning session. There were 109 responses to the survey indicating a 73% response rate.

Analysis of Research Findings

The need for academically competent, pedagogically prepared, and committed science educators has been a concern for secondary schools in an urban setting in public education for many years now (Modebelu & Kalu-Uche, 2013). The number of studies that have been done regarding overall teacher retention issue has been done the challenge to keep teachers in classrooms has continued to be an issue for the public school system (Borman & Dowling,2008). After examination of the demographic profile, the 62% of the teachers that responded 5 years of more of teaching experience in the field, 43% were over 40 years of age, 41% were Hispanic, and 50% had a salary over $46,000 a year.

The participants indicated that the most important professional retention factor was support from administrators and that the least important professional retention factor was teaching in a variety of settings. In addition, the same participants indicated that the most important personal retention influence was a positive interaction with the students. The least important personal retention factor was contact with students in the community.

The analysis of the demographic groups was done to determine if there were any relationships among demographics and the personal and professional retention influences. Results indicated that there was not a correlation except in the area of ethnicity in relationship to leadership in the profession among the minority group.

Discussion of Research Findings

Education reform is currently one of the top public policy issues, both nationally and in Texas (Luzer, 2013). Contrary to past efforts at public education reform, most of the current research is focuses on the qualifications of public educators. Daniel Luzer , in his March 2013 article about school reform in Texas states

> "Texas was in many ways the flagship state for school reform. It's the first state that began to institute serious sanctions against low student and teacher performance and one of the first to enthusiastically make use standardized tests as the major indicator for school success."

In the mid-1980's, education research was primarily reports on teacher quality concerns. More than ten years later, the next wave of teacher reform reports has attracted the attention of policy makers and educators (Smith & Ueneo, 2005). The reports show that the lack of trained, highly qualified teachers is significantly impacting the success of students and their academic achievement (Ingersoll, 2003). The reports provide specific solutions to repair the problems and

improve teacher quality in four specific areas: Recruitment, preparation, professional development and retention (Darling-Hammond &Haselkom, 2009).

The findings in this research indicated that these could also be important retention factors for this district's secondary science teachers but expanded that to include basic things such as adequate time to prepare for the job as well as having adequate supplies for the job.

Proper induction programs, although a key focus in education reform (Day & Gu, 2009) did not appear to be as critical for the respondents as expected but this group of teacher only had less than 50% with 5 years or less of teaching experience. Being far removed from being a novice teacher could be a reason that connection was not a point of emphasis (Ingersoll, 2005).

Administrative support has been cited as an important aspect of teacher growth as well as retention and attrition (Heck, 2007). This study revealed that support from administrators was considered to be the most important professional retention factor for these secondary science teachers. Another aspect of administrative support are the policies and procedures that support the teacher in the classroom (Heck, 2007). This study shows alignment with that area of research. Recognition from administrators was not a key factor in influencing them to remain administrators according to this study however.

Inman and Marlow (2004) cited salary as a retention factor for teachers but this study showed it as a minor issue with this group of participants as opposed to a major reason they stay in the classroom.

Professional development has been shown as a key factor in retention factors according to many studies regarding educator preparation, retention and attrition. (Loucks-Horsley, Love, Stiles, Mundry& Hewson, 2003). The quality and relevance to the field of science and the applicability of the information taught in these sessions was an important factor for teacher

training, levels of preparedness to teach the concepts and for overall teacher well-being in the professional setting (Gess-Newsome, 2001). The results of this study aligned with that information and showed that it is an important factor to this group of science educators.

Research studies conducted by the Taylor (2004), Rosenholtz, (1989), Schlechty and Vance (1998) and Ruhland (2001) found that teacher's inner sense of efficacy mattered as a major retention factor. The intrinsic reward mattered to the educator in regards to student interactions and student performance in the classroom (Brunetti, 2001). The positive interaction with students showed in this study to be one of the most important for this group of science educators and was a connecting factor to self-efficacy (Bandura, 1981). Intrinsic rewards were retention influences according to this study. Participants indicated in the survey that having an inner sense of knowing that they are doing a good job, having a positive interaction with students, and seeing students comprehend the concepts being taught were among the three most important personal retention factors for them.

The results in this study aligned o the research that has been previously done regarding science teachers and their retention and attrition factors. The areas of similarities to previous studies included support from administrators, pleasant working conditions, salary, availability of resources, inner sense of doing a good job, and students comprehending concepts being taught. .

Conclusions

Science education is a critical part of the secondary curriculum (DeBoer, 1991). Understanding the factors that are important to science teachers and what contributes to their continued commitment to the profession can be a helpful too in building effective teacher support programs to keep them in the classrooms.

Factors affecting teacher retention have not changed dramatically over the last 20 years. This is evident from the research shown and the aligned responses form the participants surveyed. Factors such as adequate materials and facilities, positive work climate, positive teaching experience, adequate time to complete job responsibilities, and potential advancement are still surfacing as those factors teachers deem important. A surprising and noteworthy result is the support teachers require from administrators in the work they do in the classroom. The focus of educational reform has not been on leadership but has centered on the teacher and the quality of services they provide in the classroom setting. This is an avenue of exploration for further study and review for this school district.

Implications

Science education has changed significantly with the changes in technology, new developments in research and the evolution of social media. Information is now more readily available for students and educators than it ever has been before (NRC, 2011). However, what has not changed is the underlying concept of training young people to be problem solvers, decision makers, and productive, skilled citizens (Morris, 2006).

The findings in this study could be used to improve the local professional development programs, to heighten awareness of administrative teams in their decision making regarding the campus science programs and to inform their own professional practices with recruitment, induction, and retention. District and campus leaders should be concerned with retaining science educators.

Future Studies

An aspect of this study that could be explored further is the exact area of science instruction that teachers teach within. Does the area of science they teach matter as a retention

influence? That question went beyond the scope of this work but would yields an interesting result to the findings. Exploring the level of middle grade instruction to the high school grade instruction would also be an insightful research angle. Does their certification area match their instructional area in the middle grades as it must in the high school grades? Does their Bachelor's degree and their teacher certification matter to their level of self-efficacy and job satisfaction in the area they have been assigned to teach in?

The review of literature indicated a gap in research specific to South Texas. This study could be expanded to include all of Region 2 in this area of South Texas to compare the results and overall findings.

Mentoring and induction were retention factors mentioned but an expansion of this study just for a targeted group of novice educators could be conducted. Also a study of the difference in responses between veteran teachers that were part of a mentoring and induction program compared to those who were not would add an element of interest to refining those programs.

Regardless of the content area and grade level, a deep understanding of why teachers teach, and especially why they remain in the profession is a key component to the future of the profession. All educational leaders should have a thorough understanding of this and use it to inform their daily decision making since it is the policies and guidelines that they develop that guide the work that is done in the trenches daily. Support of administrators mattered to these teachers. This is an important point of learning for all that lead in the field of education. Educational leaders at all levels of education should seek to understand reasons that teachers remain in the teaching profession and use that information to combat attrition to keep dedicated teachers in the classroom.

Appendix A

Information Sheet for the Survey

An Analysis of Factors that Influence Secondary Science Teachers in an Urban School District in South Texas to Remain in the Teaching Profession.

Dear Participant,

I would like to ask you to participate in the data collection for a study regarding Factors that Influence Secondary Science Teachers to Remain in the Teaching Profession conducted through Texas A&M University Corpus Christi.

My intent is to better understand the following issues:

- What professional factors influence you to remain a teacher in this area?
- What personal factors influence you to remain in the teaching profession?
- Who are the teachers that teach in this area?
- What can we learn from existing teachers to promote the profession and build capacity in our new science educators?

Participation in this study is entirely voluntary. It will involve a questionnaire that will be completely anonymous. No personally identifying information will be on the document.

You may decide not to participate. The information you provide is confidential, except that with your permission anonymised quotes may be used. If you request confidentiality, beyond anonymised quotes, information you provide will be treated only as a source of background information, alongside literature-based research and interviews with others.

Your name or any other personal identifying information will not appear in any publications resulting from this study; neither will there be anything to identify your place of work.

The information gained from this survey will only be used for the above objectives, will not be used for any other purpose and will not be recorded in excess of what is required for the research.

Even though the study findings may be published in conferences and journals, only the researcher will have access to the survey data itself. There are no known or anticipated risks to you as a participant in this study.

If you have any questions regarding this study or would like additional information please ask the researcher before, during, or after the meeting.

Yours Sincerely,

Bonnie Stephan Montoya
Doctoral Student
Texas A&M University Corpus
dookietexas@yahoo.com

Appendix B

The Survey

Retention Influences of Secondary Science Teachers Survey

This survey is being conducted for a dissertation entitled "An Analysis of Factors that Influence Secondary Science Teachers in an Urban School District in South Texas to Remain in the Teaching Profession." Please take a few minutes to provide me with your opinions regarding influences on retention of secondary science teachers. Your responses will be kept confidential and you will not be identified individually in any way in the findings of the study. Thank you for your participation. **Definitions**: Secondary Science Teacher–for the purposes of this study a secondary science teacher will be any teacher who teaches science in grades 6-12.

Part 1: Retention Influences

Rate each item as to its importance in determining your interest to continue teaching with one

(1) being not important to five (5) no opinion.

(1) not important **(3) very important**

(2) somewhat important **(4) extremely important**

1. Positive teaching experience	1	2	3	4
2. Professional development opportunities	1	2	3	4
3. Participation in professional associations	1	2	3	4
4. Inner sense of knowing I'm doing a good job	1	2	3	4
5. Availability of mentoring program	1	2	3	4
6. Teach in a variety of settings	1	2	3	4
7. Recognition of and support by peers	1	2	3	4
8. Positive interaction with students	1	2	3	4
9. Adequate time to complete job responsibilities	1	2	3	4
10. Pleasant working conditions	1	2	3	4

11. Quality and quantity of resources available	1	2	3	4
12. Potential for leadership opportunities	1	2	3	4
13. Potential for salary increases	1	2	3	4
14. Policies/procedures that support the teacher	1	2	3	4
15. Contact with students in the community	1	2	3	4
16. Seeing students comprehend the concepts being taught	1	2	3	4
17. Recognition from administrators	1	2	3	4
18. Support from administrators	1	2	3	4
19. Support of parents	1	2	3	4
20. Acknowledgment of support by parents for their child.	1	2	3	4
21. Satisfied with teaching salary	1	2	3	4
22. Watching student grow intellectually	1	2	3	4

Part 2: Demographics

Please check the appropriate answer.

1. How long have you been a secondary science teacher (whether in this district or not)?

YEARS _____ Months_____

2. Age

_____Under 30 _____51-60

_____31-40 _____61-70

_____41-50 _____over 70

3. Ethnicity:

_____White, non-Hispanic _____Native American

_____Black, non-Hispanic _____Asian/Pacific Islander

_____Hispanic
_____Other

4. Current Salary

_____over $46,000 _____$26,000 to $35,999

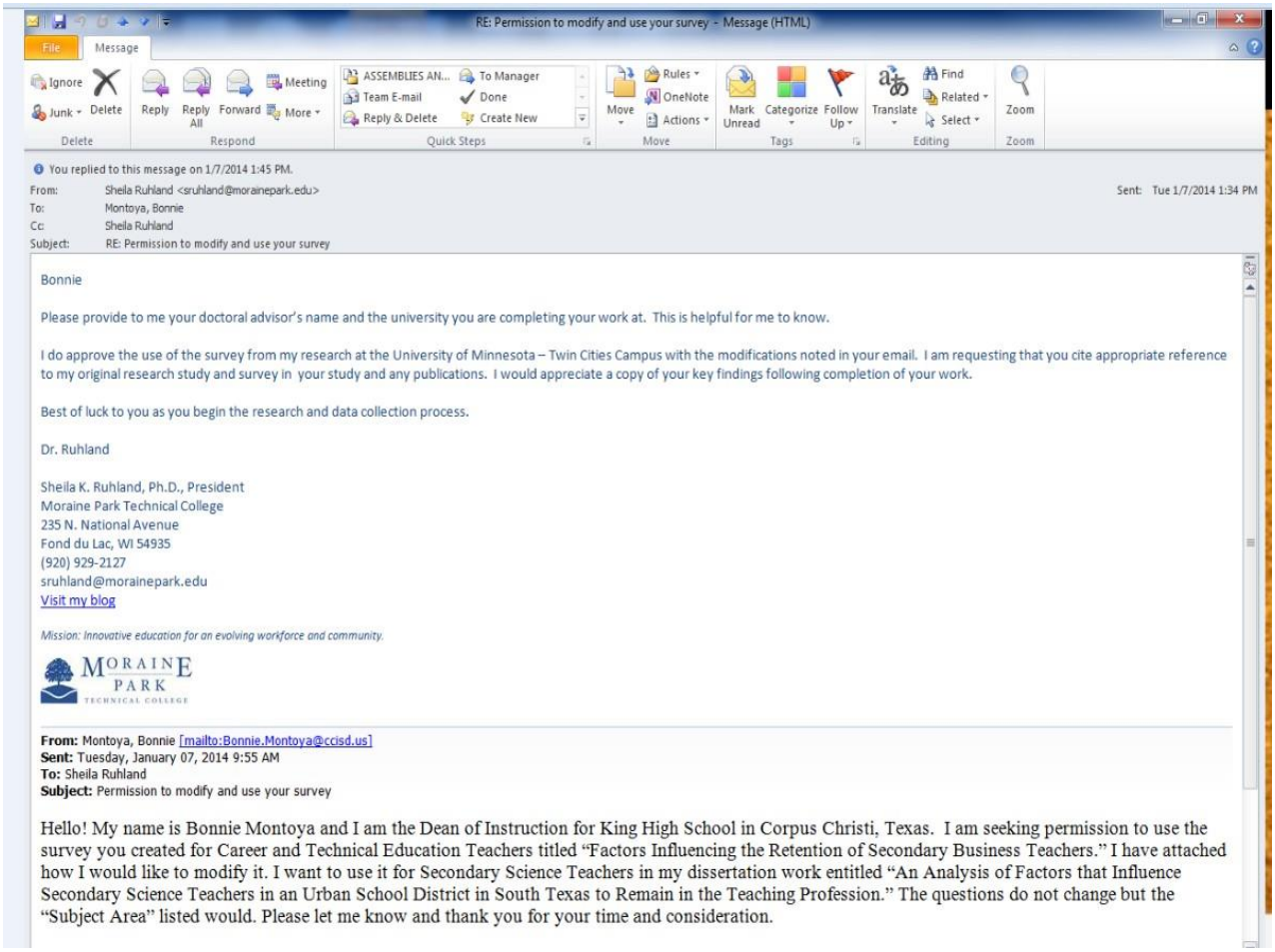
_____$36,000 to $45,999 _____Less than $25,999

5. Subject area(s) licensed or certified to teach:

	Composite Science		6-8 Life Science
	Biology ONLY		Earth and Space
	Physics ONLY		7-12 Life Science
	Chemistry ONLY		7-12 Physical Science
	4-8 Generalist		EC-6 Generalist
	6-8 Generalist		8-12 Physical Science
	4-8 Science		6-8 Science
	6-8 Physical Science		Other: (please list)
	Life Science ONLY		
	Physical Science ONLY		

Appendix C

Permission to modify and use existing survey



RE: Permission to modify and use your survey - Message (HTML)

File | Message

Ignore | Junk | Delete | Reply | Reply All | Forward | Meeting | More | Delete | Respond

ASSEMBLIES AN... | Team E-mail | Reply & Delete | To Manager | Done | Create New | Quick Steps

Move | Rules | OneNote | Actions | Move

Mark Unread | Categorize | Follow Up | Tags

Translate | Find | Related | Select | Editing

Zoom | Zoom

You replied to this message on 1/7/2014 1:45 PM.

From: Sheila Ruhland <sruhland@morainepark.edu>
To: Montoya, Bonnie
Cc: Sheila Ruhland
Subject: RE: Permission to modify and use your survey

Sent: Tue 1/7/2014 1:34 PM

Bonnie

Please provide to me your doctoral advisor's name and the university you are completing your work at. This is helpful for me to know.

I do approve the use of the survey from my research at the University of Minnesota – Twin Cities Campus with the modifications noted in your email. I am requesting that you cite appropriate reference to my original research study and survey in your study and any publications. I would appreciate a copy of your key findings following completion of your work.

Best of luck to you as you begin the research and data collection process.

Dr. Ruhland

Sheila K. Ruhland, Ph.D., President
Moraine Park Technical College
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Visit my blog

Mission: Innovative education for an evolving workforce and community.

MORAINE PARK TECHNICAL COLLEGE

From: Montoya, Bonnie [mailto:Bonnie.Montoya@ccisd.us]
Sent: Tuesday, January 07, 2014 9:55 AM
To: Sheila Ruhland
Subject: Permission to modify and use your survey

Hello! My name is Bonnie Montoya and I am the Dean of Instruction for King High School in Corpus Christi, Texas. I am seeking permission to use the survey you created for Career and Technical Education Teachers titled "Factors Influencing the Retention of Secondary Business Teachers." I have attached how I would like to modify it. I want to use it for Secondary Science Teachers in my dissertation work entitled "An Analysis of Factors that Influence Secondary Science Teachers in an Urban School District in South Texas to Remain in the Teaching Profession." The questions do not change but the "Subject Area" listed would. Please let me know and thank you for your time and consideration.

Appendix D

Permission from CCISD

Office of Assessment and Accountability

CORPUS CHRISTI INDEPENDENT SCHOOL DISTRICT
P. O. Box 110 • Corpus Christi, Texas 78403-0110
3130 Highland Avenue • Corpus Christi, Texas 78405
Office: 361-844-0396 • Fax: 361-886-9371
Website: www.ccisd.us

January 14, 2014

Bonnie L. Montoya
3034 Halifax Dr.
Corpus Christi, TX 78412

Dear Ms. Montoya:

Formal permission is granted to you to conduct your research entitled *An Analysis of Factors that Influence Secondary Science Teachers in an Urban School District in South Texas to Remain in the Teaching Profession* in the Corpus Christi Independent School District (District). This permission indicates that your proposal meets all research/evaluation and FERPA standards.

This permission allows the campuses/principals identified in your proposal the option of participating or not. No campus/principal is required to participate in this study.

It is a pleasure to welcome you to the District as you begin this significant research initiative. At the conclusion of your work, please provide my office with a copy of the results.

Should you need additional assistance during your study or have changes in the proposal, please contact me at 361-844-0396, ext. 44250 and/or via e-mail at James.Gold@ccisd.us.

Sincerely,

James H. Gold
Executive Director

JHG/mdf

cc: Dr. D. Scott Elliff
Dr. Bernadine Cervantes

Appendix E

IRB Letter

TEXAS A&M UNIVERSITY CORPUS CHRISTI

OFFICE OF RESEARCH COMPLIANCE
Division of Research, Commercialization and Outreach

6300 Ocean Drive, Unit 5844
Corpus Christi, Texas 78412
O 361.825.2497 · F 361.825.2755

Human Subjects Protection Program — Institutional Review Board

APPROVAL DATE:	February 13, 2014
TO:	Ms. Bonnie Leigh Montoya
CC:	Dr. Bryant Griffith
FROM:	Office of Research Compliance Institutional Review Board
SUBJECT:	Initial Approval
Protocol Number:	13-14
Title:	Science Teacher Development: An Analysis of Factors that Influence Secondary Science Teachers in Urban School District in South Texas to Remain in the Teaching Profession
Review Category:	Exempt from IRB Full Board Review

Approval determination was based on the following Code of Federal Regulations:

Eligible for Exempt Review (45 CFR 46.101)

Criteria for Approval has been met (45 CFR 46.101) - The criteria for approval listed in 45 CFR 46.101 have been met (or if previously met, have not changed).

(2)Research involving the use of educational tests (cognitive, diagnostic, aptitude, achievement), survey procedures, interview procedures or observation of public behavior, unless: (i) information obtained is recorded in such a manner that human subjects can be identified, directly or through identifiers linked to the subjects; and (ii) any disclosure of the human subjects' responses outside the research could reasonably place the subjects at risk of criminal or civil liability or be damaging to the subjects' financial standing, employability, or reputation.

Provisions:

Comments: The TAMUCC Human Subjects Protections Program has implemented a post-approval monitoring program. All protocols are subject to selection for post-approval monitoring.

This research project has been approved. As principal investigator, you assume the following responsibilities:

1. Informed Consent: Information must be presented to enable persons to voluntarily decide whether or not to participate in the research project unless otherwise waived.
2. Amendments: Changes to the protocol must be requested by submitting an Amendment Application to the Research Compliance Office for review. The Amendment must be approved before being implemented.
3. Completion Report: Upon completion of the research project (including data analysis and final written papers), a Completion Report must be submitted to the Research Compliance Office.
4. Records Retention: Records must be retained for three years beyond the completion date of the study.
5. Adverse Events: Adverse events must be reported to the Research Compliance Office immediately.
6. Post-approval monitoring: Requested materials for post-approval monitoring must be provided by dates requested.

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