

ELEMENTARY PRE-SERVICE TEACHER PREPAREDNESS IN LITERACY AND
MATHEMATICS AS IT RELATES TO ANXIETY AND SELF-EFFICACY

by

Lamarcia J. Miller

Liberty University

A Dissertation Presented in Partial Fulfillment

Of the Requirements for the Degree

Doctor of Education

Liberty University

2019

ELEMENTARY PRE-SERVICE TEACHER PREPAREDNESS IN LITERACY AND
MATHEMATICS AS IT RELATES TO ANXIETY AND SELF-EFFICACY

by

Lamarcia J. Miller

A Dissertation Presented in Partial Fulfillment

Of the Requirements for the Degree

Doctor of Education

Liberty University, Lynchburg, VA

2019

APPROVED BY:

Dr. Araceli Montoya, Committee Chair

Dr. David Barton, Committee Member

Dr. Angie Caraway, Committee Member

ABSTRACT

This study attempted to determine if there is a significant relationship between pre-service teacher preparedness in literacy and mathematics and the levels of anxiety and self-efficacy felt by the pre-service teachers. The research questions are as follows: Is there a significant correlation between the number of college course hours a pre-service teacher has taken in literacy and that teacher's teaching anxiety? Is there a significant correlation between the number of college course hours a pre-service teacher has taken in mathematics and that teacher's teaching anxiety? Is there a significant correlation between the anxiety level the pre-service teacher feels in literacy and that teacher's teaching self-efficacy? Is there a significant correlation between the anxiety level the pre-service teacher feels in mathematics and that teacher's teaching self-efficacy? A correlational study design was utilized to determine the correlation between the number of course hours taken by a pre-service teacher in reading and mathematics and the level of anxiety and self-efficacy felt by the pre-service teacher. Students at four universities completed the Student Teaching Anxiety Scale, the Reading Teaching Efficacy Instrument, the Mathematics Teaching Efficacy Beliefs Instrument, and one short demographic survey that asks participants demographic information and the number of course hours that were included in literacy and in mathematics. The sample size was 68 pre-service teachers from four universities. Data were analyzed and statistical tests were performed using SPSS. Spearman Correlation coefficients were calculated in order to analyze research questions 1-4. Results showed that while there was no significant relationship between the number of course hours pre-service teachers completed in either literacy or mathematics, there was a significant relationship between teaching anxiety and the teachers' feelings of self-efficacy in both literacy and mathematics.

Keywords: teacher training, pre-service training, self-efficacy, teacher anxiety, literacy self-efficacy, mathematics self-efficacy

Table of Contents

LIST OF TABLES	8
LIST OF FIGURES	9
LIST OF ABBREVIATIONS.....	10
CHAPTER ONE: INTRODUCTION.....	11
Overview	11
Background	11
Problem Statement.....	15
Purpose Statement.....	16
Significance of Study.....	16
Research Questions	17
Null Hypotheses.....	17
Definitions.....	18
CHAPTER TWO: LITERATURE REVIEW	19
Overview`	19
Introduction.....	19
Conceptual Framework.....	20
Related Literature.....	25
Pre-service Training.....	25
Teacher Certification	31
In-service Training.....	34
Social Cognitive Theory/Teacher Self-Efficacy.....	35
Anxiety.....	44
Summary	49

CHAPTER THREE: METHODS	50
Overview	50
Design	50
Research Questions	51
Null Hypotheses	51
Participants and Setting.....	52
Instrumentation	54
Teaching Anxiety Scale.....	55
Mathematics Teaching Efficacy Beliefs Instrument	55
Reading Teaching Efficacy Instrument.....	56
Procedures	58
Data Analysis	59
CHAPTER FOUR: FINDINGS	61
Overview	61
Research Questions	61
Null Hypothesis	61
Descriptive Statistics.....	62
Results.....	65
Research Question 1	66
Research Question 2	69
Research Question 3	70
Research Question 4	75
Summary.....	79

CHAPTER FIVE: CONCLUSION.....	81
Overview	81
Discussion	81
Null Hypothesis 1 & 2.....	81
Null Hypothesis 3.....	83
Null Hypothesis 4.....	85
Implications	86
Conclusions and Recommendations.....	88
Limitations.....	89
Recommendations for Future Research	90
REFERENCES	92
APPENDIX A.....	107
APPENDIX B.....	109
APPENDIX C.....	110

List of Tables

Table 1: Demographic Characteristics of the Sample	54
Table 2: Course hours taken in literacy and mathematics	62
Table 3: Descriptive statistics and inter-item reliability for all scales and sub-scales	65
Table 4: Descriptive statistics and inter-item reliability for literacy and math courses hours and Teacher Anxiety Scale	68
Table 5: Descriptive statistics and internal reliability of the Reading Teacher Efficacy instrument and subscales	72
Table 6: Descriptive statistics and internal reliability of the Mathematics Teaching Efficacy instrument and subscales	77

List of Figures

Figure 1. Box-and-Whisker Plot of Teacher Anxiety Scores	67
Figure 2. Frequency Distribution of Teacher Anxiety Scale scores	67
Figure 3. Box-and-Whisker plot of Reading Teaching Efficacy instrument	71
Figure 4. Frequency Histogram for the Reading Teaching Efficacy instrument	72
Figure 5. Scatterplot of the relationship between participants' scores on the teaching anxiety scale and the reading teaching self-efficacy sub-scale.	74
Figure 6. Scatterplot of the relationship between participants' scores on the teaching anxiety scale and the reading teaching outcome-expectancy sub-scale.	75
Figure 7. Box-and-Whisker plot of Mathematics Teaching Efficacy instrument	76
Figure 8. Frequency Histogram for the Mathematics Teaching Efficacy instrument	76
Figure 9. Scatterplot of the relationship between participants' scores on the teaching anxiety scale and the mathematics teaching self-efficacy sub-scale.	78
Figure 10. Scatterplot of the relationship between participants' scores on the teaching anxiety scale and the mathematics teaching outcome-expectancy sub-scale.	79

List of Abbreviations

ESEA	Elementary and Secondary Education Act
MTEBI	Mathematics Teaching Efficacy Beliefs Instrument
MTOE	Mathematics Teaching Outcome Expectancy
NCATE	National Council for Accreditation of Teacher Education
NCLB`	No Child Left Behind
PMTE	Personal Mathematics Teaching Efficacy Beliefs
RTEI	Reading Teaching Efficacy Instrument
RTOE	Reading Teaching Outcome Expectancy
RTSE	Reading Teaching Self-Efficacy
RTTT	Race To the Top Initiative
TAS	Teaching Anxiety Scale

CHAPTER ONE: INTRODUCTION

Overview

Chapter one begins with a brief background on the requirements placed on schools for teachers and the importance placed on being highly qualified as well as the amount of anxiety this importance can generate affecting teacher self-efficacy. The problem statement discusses the need for research concerning whether more training in specific content areas has any effect on teaching anxiety and self-efficacy and the purpose statement proposes to determine if any correlation exists. The significance of the study describes how this study will contribute to the existing body of knowledge seeking to determine a relationship exists between the number of course hours a pre-service teacher has taken in specific subject areas, literacy and mathematics, and the level of anxiety and self-efficacy the pre-service teacher experiences during student teaching. The research questions that make up the foundation for this study are listed in this chapter, along with any terms and definitions that are pertinent to the study.

Background

As new teachers enter the educational workforce, they find themselves in a struggle between the joy of teaching and the responsibility to adequately present the information necessary for students to show mastery and growth in various academic areas. In 2002, the No Child Left Behind (NCLB) legislation was enacted that emphasized the need for teachers to be considered highly qualified in the academic areas being taught (NCLB, 2002). For a teacher to be highly qualified, the teacher should have a college degree, state licensure, and teach in the area in which they are licensed (NCLB, 2002). While the government leaders have changed over the years, the drive for educational excellence has continued. In 2009, the Race to the Top

Initiative (RTTT), which is a part of the federal American Recovery and Reinvestment Act of 2009, set initiatives for school change in the form of grants as opposed to the mandates of NCLB. The focus of RTTT is on effectiveness of teachers as well as qualifications, essentially the quality of teachers in the classroom (Lohman, 2010; Superfine, Gottlieb, & Smylie, 2012). The Elementary and Secondary Education Act (ESEA) of 2010 reinforced the highly qualified requirement for schools.

Since NCLB required that teachers be highly qualified in core content areas, the elementary teacher was presented with the challenge to be knowledgeable in several core areas. The traditional setting for the elementary classroom required the elementary teacher to act as a generalist, demonstrating knowledge in a variety of content areas. According to Richardson (2008), students who are taught by knowledgeable teachers perform better academically; therefore, the push for a highly qualified teacher in every classroom is a necessity, not a wish. However, knowledge of subject matter allows a teacher to instruct more effectively, which can lead to improved student learning. Expecting elementary teachers to have specialized knowledge for every subject taught has proven unrealistic (McGrath & Rust, 2002). RTTT also puts emphasis on teacher qualifications, which can lead to greater teacher effectiveness. Some states put monies received from these grants to strengthen teacher preparation and support (Reyes-Guerra & Lochmiller, 2016).

Many studies state that students base their ideas regarding learning and subject matter on the ideas the teacher holds and that teachers must have the ability to effectively communicate these ideas to students (Boyd, Grossman, Lankford, Loeb, & Wyckoff, 2009; Henry et al., 2011; Hill, Rowan, & Ball, 2009; Loewen, 2013; Tchoshanov, 2011). There are few problems in recent educational history that have received as much attention as the failure to staff public

school classrooms with teachers who are qualified to teach (Ingersoll, 1999). The public school systems work to ensure that each teacher in each classroom meets the highly qualified standard in compliance with the NCLB legislation (NCLB, 2002).

To help determine if a teaching candidate is knowledgeable, states implemented licensure standards and procedures for teachers entering the classroom, including a series of examinations that must be passed in order to earn a teaching license. The traditional route requires an education degree with all of the steps involved along with passing scores on these examinations. However, in an attempt to boost the ranks of teachers and to encourage those who have great knowledge in certain areas, states introduced alternate routes to obtaining teaching certificates. These new teachers are able to enter the classroom without having the same course work or student teaching experience as a traditional teacher but still are required to pass the licensure examinations (Shuls & Trivitt, 2015).

Training teachers is not just about content knowledge, but a mix of content knowledge and methodology. If a teacher has content knowledge but does not have the tools with which to disseminate that knowledge to students, the teacher may be ineffective in the classroom. When training teachers, there should be an equal emphasis on content knowledge and methodology in order to find that balance (Brewer, 2003). Goldstein and Noguera (2006) found that the majority of teachers who are entering the workforce are not performing at a high level of effectiveness upon entry, regardless of the strong academic background. Some suggest that an extended period of student teaching, one full school year instead of simply one semester, pre-service teachers left the program with a stronger feeling of confidence in their ability to teach and manage a classroom (Colson, Sparks, Berridge, Frimming, & Willis, 2017). Others believe that this high level of effectiveness comes through years of experience. This has lead some researchers to

claim that student achievement can be directly linked to a teacher's preparation, the content knowledge, and the delivery of instruction (Goldstein & Noguera, 2006). Tchoshanov (2011) found that students who were taught by teachers with greater content knowledge showed higher achievement on standardized testing. These teachers were also found to be more conceptual in teaching style than teachers with less content knowledge. Rahman, Nabi, Akhter, Hasan, and Ajmal (2011) found that student achievement is a combination of student and teacher, both contributing to learning.

Teaching self-efficacy is a teacher's belief in the ability to engage all students in the learning process (Bandura, 1977). Bandura's self-efficacy beliefs are rooted in his social cognitive theory, that people learn through observation and that beliefs affect learning (1977). Self-efficacy is specific to the context, according to Bandura (1977, 1986). Therefore, teachers of literacy should have high efficacy in literacy, science in science, math in math, etc. Furthermore, a study by Oh (2011) found that some potential sources that affect teacher self-efficacy include personality traits, skills, and motivation. Akhter, Kanwal, Fatima, and Mahmood (2016) found in their study that a high level of self-efficacy due to interaction with students, other teachers, and supervisors led to an increase in self-efficacy which was able to raise a pre-service teacher's ability to perform a particular task because of the level of content competency and knowledge to deal with the situation presented.

High content knowledge can lead to higher levels of self-efficacy and lower levels of teaching anxiety (Tchoshanov, 2011). This high content knowledge is linked to teacher preparation (Goldstein & Noguera, 2006). Lake and Kelly (2014) conducted a study to determine if anxiety decreased for pre-service teachers. This study determined that pre-service teacher anxiety decreased as a result of mathematics content and teaching methods courses available,

thereby increasing content knowledge for these new teachers. Bursal and Paznokas (2006) draw a relationship between teacher anxiety and Bandura's theoretical framework, stating that the first years of teaching will form the foundation on which a teacher will base her level of anxiety. A teacher's anxiety is linked to the expectation of the teacher to effectively deliver the content material (Bursal & Paznokas, 2006).

Problem Statement

NCLB mandates that public schools ensure that all teachers are considered highly qualified as defined by federal standards (NCLB, 2002). While this goal is admirable, the elementary teacher is not viewed as a content specialist, but as a generalist, making it harder to meet the highly qualified standard (McGrath & Rust, 2002). RTTT also focuses on teacher qualifications, but ties this to teacher effectiveness (Lohman, 2010). The focus of these policies is teacher quality, which in turn affects student performance (Superfine et al., 2012). While there has been research on the level of anxiety teachers feel in teaching a specific content area and on the level of self-efficacy, it has focused mainly on content area teachers, middle-school and high-school teachers, most specifically in the areas of mathematics and science. Because of the requirements to show growth in literacy and in mathematics at the elementary level, elementary teachers feel more pressure to be proficient in these specific disciplines. Pre-service teachers who graduate with a high degree of anxiety are more likely to pass that anxiety on to students (Daniels, Mandzuk, Perry, & Moore, 2011). Effective training affects the self-efficacy of teachers (Colson et al., 2017; Preston, 2017; Velthuis, Fisser, & Pieters, 2014). Currently, the majority of research is focused more on the anxiety and self-efficacy of teachers who are actively working in the classroom with less research focused on these pre-service teachers (Adams, 2008; Fetler, 2001; Foster, Toma, & Troske, 2013; Harris & Sass, 2011; Zee & Koomen, 2016). There

is a need for further studies focused specifically on the levels of anxiety and self-efficacy experienced by pre-service elementary teachers when looking forward to teaching literacy and mathematics. The problem is the lack of studies on the correlation between the amount of course work and levels of anxiety and self-efficacy of pre-service teachers.

Purpose Statement

The purpose of this proposed quantitative correlational study is to determine if there is a statistically significant correlation between the number of course hours a teaching student takes in literacy and mathematics and the level of anxiety and self-efficacy that the pre-service teacher feels when contemplating teaching these subjects. The predictor variable will be generally defined as the number of course hours in literacy and mathematics taken by the pre-service teacher. The criterion variables will be generally defined as the level of anxiety and the level of self-efficacy of the pre-service teacher. This understanding can be used to assist higher education professors and administrators to design elementary education course work that will increase pre-service teacher confidence, and in turn increase new teacher effectiveness in the classroom.

Significance of the Study

High content knowledge can lead to higher levels of self-efficacy and lower levels of teaching anxiety (Tchoshanov, 2011). States are working to ensure that teachers are of high quality through licensure requirements (Shuls & Trivitt, 2015). Universities are seeking to determine how to train teachers to become more effective after leaving the post-graduate setting (Akhter et al., 2016; Lake, & Kelly, 2014). The current research into teacher anxiety and self-efficacy focuses mainly on teachers who are currently working in the classroom (Adams, 2008; Fetler, 2001; Foster, Toma, & Troske, 2013; Harris & Sass, 2011; Zee & Koomen, 2016). The

studies that focus on pre-service teachers have done little to determine if a relationship exists between university course work and anxiety or self-efficacy. This study is significant because it will help to bridge this gap in the literature by determining if a relationship exists between the number of course hours a pre-service teacher has taken in specific subject areas, literacy and mathematics, and the level of anxiety and self-efficacy the pre-service teacher experiences during student teaching. This study will serve to provide universities with evidence as to the validity or non-validity of the education program and curriculum, specifically whether the number of course hours for elementary education majors is sufficient to provide candidates with a base on which to build strong teaching practices and thereby become confident, effective educators. An elementary education program that produces strong, confident teachers will continue to support and strengthen the teaching field.

Research Questions

The study was designed to answer the following research questions.

- RQ1** – Is there a relationship between the number of college course hours a pre-service teacher has taken in literacy and that teacher's teaching anxiety?
- RQ2** – Is there a relationship between the number of college course hours a pre-service teacher has taken in mathematics and that teacher's teaching anxiety?
- RQ3** – Is there a relationship between the anxiety level the pre-service teacher feels in literacy and that teacher's teaching self-efficacy?
- RQ4** – Is there a relationship between the anxiety level the pre-service teacher feels in mathematics and that teacher's teaching self-efficacy?

Definitions

1. *Self-efficacy* - defined as the teacher's belief about his own ability to engage all students in learning (Bandura, 1977). For purposes of this study, self-efficacy will be studied as it directly relates to the teaching of literacy or mathematics in the elementary classroom.

2. *Teaching anxiety* - refers to the teacher's perception of how effectively material can be delivered to students (Bursal & Paznokas, 2006).

3. *Reading Teaching Efficacy Instrument (RTEI)* - refers to the reading efficacy instrument used in the study. This instrument is used to determine the level of efficacy a teacher feels when teaching reading (Szabo & Mokhtari, 2004).

4. *Mathematics Teaching Efficacy Beliefs Instrument (MTEBI)* - refers to the mathematics efficacy instrument used in the study. This instrument is used to determine the level of efficacy a teacher feels when teaching mathematics (Enochs, Smith, & Huinker, 2000).

CHAPTER TWO: LITERATURE REVIEW

Overview

Chapter two provides a thorough review of the existing literature on factors that affect teacher anxiety and self-efficacy, focusing specifically on pre-service, or student, teachers. A brief look at the conceptual framework is presented, focusing on regulations that are in place to ensure that schools provide a quality education for all students including hiring teachers who are considered highly qualified in the area in which they teach and how this affects teacher and pre-service teacher anxiety and self-efficacy. The chapter summarizes what is currently known through the existing literature, including training for pre-service and existing teachers, teacher certification, anxiety in both pre-service and existing teachers, and Bandura's social cognitive theory as it relates to teacher self-efficacy.

Introduction

This literature review consists of a review of literature related to the study of the impact of teacher education and training on teacher self-efficacy and, subsequently on test scores in the elementary arena. This literature review will focus on areas of teacher training, both pre-service and professional development, teacher self-efficacy, and standardized test scores in the United States. The purpose of this literature review is to provide a framework for viewing teacher education and training and to examine the current literature in the area of content knowledge of teachers and teacher training as it impacts math and science test scores and classroom practice. Further, the gap in the literature, the lack of research determining if there is a correlation between college course work and pre-service teacher anxiety and self-efficacy, will be examined.

Conceptual Framework

President George H. W. Bush enacted the No Child Left Behind Act (NCLB) during the 107th Congress to close the achievement gap in schools, focusing on accountability, flexibility, and choice, so that no child was left behind. NCLB required all states to test students each year in grades three through eight in the areas of reading and mathematics. NCLB further stated the desire to improve academic achievement for disadvantaged students defined by specific subgroups (gender, race, ethnicity, learning disability, English language learners). This act included accountability consequences that offered rewards or punishment based on meeting the standard of annual yearly progress (AYP) for each subgroup. NCLB also included the implementation of Title I, designed to give all students the opportunity to enjoy a high-quality education with the goal of achieving proficiency on state assessments (NCLB, 2002).

One provision in NCLB was that all teachers in public education be highly qualified in the area in which they teach. While licensure requirements may vary slightly from state to state, most elementary teachers are required to hold a minimum of a bachelor's degree in elementary education and passing scores on a series of rigorous examinations to determine subject knowledge and teaching skills. While middle and secondary teachers are tested specifically on the subject being taught, the elementary teacher must demonstrate a working knowledge of all subject areas including reading, writing, mathematics, and other basic areas of elementary curriculum (Shuls & Trivitt, 2015). There is no stated requirement for the elementary teacher to have specialized skills in one particular subject area, rather a demonstrated comprehensive knowledge base. School districts are required to measure how many teachers in the district are considered highly qualified, adopt action plans to ensure that each teacher employed is highly qualified, and report these plans publically (NCLB, 2002). In researching the various state

requirements for licensure, some states do currently require elementary teachers to take more than a comprehensive exam to attain elementary certification (Educational Testing Service, 2013).

Ingersoll (1999) noted that there are few recent problems in education that have received as much attention as the failure to staff public school classrooms with qualified teachers. "Teachers are the key elements of maximizing the quality of education, improving schools, and successfully implementing curricula" (Köksal, 2013, p. 270). Because teachers are the people who will shape the individuals who will eventually shape a country, there are certain qualities that teacher needs. It is the job of the teacher education programs to equip pre-service teachers with these qualities within the scope of professional teacher standards (Köksal, 2013). The public school systems strive to ensure that each teacher in each classroom meets the standards of highly qualified in compliance with the NCLB legislation (NCLB, 2002). The challenges faced in improving pre-service teacher education and teaching practices are numerous, but the result of a highly qualified teacher in every classroom is a necessity (Richardson, 2008). Because quality of instruction and teacher effectiveness have been under such scrutiny as part of education reform, teacher preparation has been a target. Specifically targeted is what experiences will produce high-quality teachers (Wiseman, 2012).

After taking office, President Barack Obama once again brought education to the forefront of policy by stating that education needs to set tougher and clearer standards instead of lowering standards to fit low test scores. This was a concern that Obama's administration wanted to address during his term in office. Secretary of State Arne Duncan confirmed President Obama's assertion, insisting that educators have lowered standards in order to comply with NCLB requirements (Peterson & Carlos, 2010).

One tool for measuring the level of achievement across the United States is the National Assessment of Educational Progress (NAEP). Peterson and Carlos (2010) found when comparing NAEP scores with equivalent state testing standards that students fared better on the state tests than on the NAEP, lending credence to the accusation that states have lowered standards to meet the requirements of NCLB. When reviewing the results of the 2009 results of the NAEP, more than half of students across the United States scored below proficient on the math exam. Students seem to score higher on the state assessment in comparison to the NAEP (U.S. Department of Education, Consolidated State Performance Report, 2009). On the science exam, 16 states scored higher on average in 2011 than in 2009 (U.S. Department of Education, 2009 and 2001 Science Assessments, 2011).

In 2009, as part of the federal American Recovery and Reinvestment Act, Race To the Top was initiated. Prior to this, states received federal funding regardless of performance or attempts at school reform. Within RTTT, states compete for federal grants. Applications are graded on several criteria, including improving teacher training, evaluation and retention (McGuinn, 2012).

In 2010, the United States Department of Education created the Blueprint for Reform of Elementary and Secondary Education Act (ESEA). The ESEA reauthorized areas of NCLB and addressed concerns within NCLB including: better assessments, using data the right way, more funding to reach higher goals, meeting the needs of diverse learners, and a world-class education preparing students for higher education programs (U.S. Department of Education, ESEA Blueprint for Reform, 2010).

Also in 2010, many states adopted the Common Core Standards (CCS) as either the basis for the state standards or as the standards in their entirety. These standards, according to Bomer

and Moloch (2011), assumed that differences based on region and other factors could be reconciled by utilizing a common, universal set of curriculum standards. The CCS asserted that the purpose of education was to ready students to participate in college and to participate in careers. In the elementary or primary grades, most teachers do not think of themselves as preparing students to enter college or the workforce. The CCS takes this vision of college and career literacy all the way down to the lowest grades, to kindergarten (Bomer & Moloch, 2011).

One of the goals of NCLB, and continued with ESEA, was to increase math and science scores in relation to the rest of the global community (NCLB, 2002). According to the U.S. Department of Education, students in the United States were far from this goal near the end of 2000 (U.S. Department of Education, *Before It's Too Late*, 2000). The revision of NCLB in 2002 allowed for a Mathematics and Science Partnership, a discretionary grant program that provided for enhanced teacher training and recruiting of highly qualified math and science teachers. This program however focused mainly on science, technology, engineering, and math (STEM) departments at the high school and university levels (NCLB, 2002). The program focused on the creation of partnerships between public K-12 schools and universities to increase teacher quality (Foster et al., 2013).

According to “*Before It's Too Late*” (2000), 85% of all jobs today are classified as skilled, in comparison to 80% being classified as unskilled in 1950. This report stated that jobs, once considered unskilled, now require basic technology skills in order to function in the workplace. The same report encourages administrators to bolster math and science skills in students by employing educators who are proficient in these disciplines, injecting new energy and excitement into math and science education.

Even with the increased awareness of the importance of math and science in order to compete in the global community, students are still not showing improvement. Standardized test scores of high school students in math and science have essentially stagnated, showing little improvement since the 1980's. The gap between low performing and high performing students has continued to persist, as have gaps between racial groups. United States students continue to be noncompetitive globally, with international students performing higher on measured standards. There are a few bright spots in an otherwise bleak landscape. The gap between the genders has closed, with girls taking advanced math and science course that were traditionally populated by boys, as well as increased college attendance (Steen, 2003).

As schools are focusing on and emphasizing the importance of providing students with a high level of education by ensuring that teachers are competent and highly qualified in the field of education, the amount of anxiety faced by teachers is increasing, affecting the self-efficacy of these teachers. According to Bandura (1977), self-efficacy for a teacher is that teacher's belief that she has the ability to actively engage each student in the learning process. The belief that the teacher can have a positive impact on students and student achievement (Klassen et al., 2009). These beliefs are rooted in Bandura's social cognitive theory (1977). Within this theory, Bandura (1986) theorizes that behavior can be predicted by belief in one's own capability to complete a task. Because of this, self-efficacy is specific to the context (Bandura, 1977, 1986). Based on this theory of self-efficacy, a teacher who specializes in mathematics should have a high self-efficacy in mathematics, while a teacher who specializes in science would display a lower self-efficacy is asked to teach a literacy class.

There are many studies that have undertaken the task of determining why students score better or worse on standardized testing, even comparing U.S. student's scores to the achievement

of international students. There have been studies that have attempted to measure teacher subject knowledge and the affects of early classroom experiences on student learning. Almost all of these studies agree that students base their ideas regarding learning and subject matter on the ideas the teacher holds. These studies also agree that teachers must have the ability to effectively communicate these ideas to students (Boyd, Grossman, Lankford, Loeb, & Wyckoff, 2009; Henry et al., 2011; Hill, Rowan, & Ball, 2009; Loewen, 2013; Tchoshanov, 2011).

There are two main types of training for teachers: pre-service and in-service training (Rahman, Nabi, Akhter, Hasan, & Ajmal, 2011). Pre-service training consists of training prior to employment and, generally, includes a college degree of some kind. This pre-service training is one place where teachers gain content knowledge of the subjects that will eventually be taught in the classroom. This training is a prerequisite to educational employment. While many feel that colleges and universities are doing a good job of training new teachers, some feel that these institutions are doing an inadequate job preparing these novice teachers for the experiences that will be faced within the classroom (Alper, 2014). In-service training includes refresher courses, workshops, study groups, and any other type of training that occurs following employment in the educational arena (Rahman et al., 2011).

Related Literature

Pre-service Training

During teacher training programs in most universities, students are required to take specific courses, both general education courses and courses specific to content areas. One concern some have is that many of the professors teaching these courses have not been inside public school or non-universities classrooms in a number of years. Another concern is the fact that some universities allow students to substitute courses when a required course is full or

conflicts with the schedule of the student, even when the original course is required to graduate (Alper, 2014). One goal of a quality teacher education program is to prepare pre-service teachers to become socially conscious teachers who in turn reflect the values of the university's vision and values. Teachers who can effectively employ a variety of teaching approaches within the classroom to support all learners (Mueller & Hindin, 2011). Within their research with pre-service teachers, Mueller and Hindin (2011) found that teacher education courses do have an impact on pre-service teachers and their disposition towards teaching all students.

Research shows that knowledge of subject matter allows a teacher to teach more effectively, which leads to improved student learning (Richardson, 2008). Brewer (2003) states that teachers must find that balance between what they know about a subject and the methods through which they disseminate that knowledge to students. Training teachers is a complex mix of content knowledge and methodology. Content knowledge without the tools to convey that knowledge to students will cause a teacher to be ineffective in the classroom. Both are necessary to be an effective teacher (Brewer, 2003).

Richardson's study (2008) showed a significant relationship between student achievement and teacher qualifications. His findings show that students taught by teachers of mathematics who have five or more years of experience performed better on standardized testing than other students. Also, students who had teachers with traditional certification scored higher than students with teachers who attained certification through non-traditional routes (Richardson, 2008).

Maher (2009) followed students through the pre-service program at a research university. Students were videotaped during pre-service training, during student teaching, and again during the first year of teaching. According to Maher (2009), the essence of science instruction should

be inquiry-based instruction. The first video of instruction shows the pre-service teacher teaching a lesson using primarily inquiry-based teaching styles. The second video, taken during student teaching, shows the pre-service teacher using some inquiry-based teaching methods, but infused with more traditional teaching methods. The final video, taken during the first year of professional teaching employment, shows the teacher using even more traditional methods and very little inquiry-based instruction. Maher (2009) postulates that the reason for this change in methodology is due to increased pressure to show results on standardized testing and increased levels of paperwork. According to Rahman et al. (2011), of the recent studies on the impact of teacher training and education on student achievement, it has been shown that there is little impact on student achievement in math while elementary reading is positively impacted by teacher education and experience.

One Midwestern university implemented an extended placement idea for student teaching. In this placement, the pre-service teacher was assigned for a full school year instead of the traditional one semester. This study, by Colson et al, (2017), found the pre-service teacher to be more effective in their ability to engage students and manage classroom behavior. The study found these pre-service teacher candidate to have a higher sense of self-efficacy as they perceived themselves to be more prepared to teach independently (Colson et al., 2017).

Studies, such as the study by the National Council of Teachers of Mathematics (Post, Harel, Behr, & Lesh, 1991) present the idea that elementary teachers do not have the content knowledge necessary to properly teach mathematics to young students. Fennema & Franke (1992) conducted a study that investigated the number of course hours in math taken by teachers and student achievement, though no significant relationship was found. Hill, Rowan, and Ball (2005) studied the effect a teacher's knowledge of mathematics effects a student's achievement.

This study followed a group of students from kindergarten through second grade. This study began with a specification of teacher content knowledge each year. Through data collection from the students and the teachers each year, specifically in regards to mathematics instruction, the authors determined that teacher content knowledge positively impacted student learning, especially in the first and third grades (Hill et al., 2005).

Another area of emphasis for some pre-service teaching programs is becoming a teacher leader, whether that is remaining in the classroom and being in a teaching role as well as a teacher leader role, or serving in a more formal leadership capacity (Bond, 2011). Bond (2011) advocates introducing the idea of teacher leadership early in teacher training alongside teaching pedagogy. The reasoning behind introducing leadership at this crucial time in pre-service training is specifically because this is a crucial time in which philosophies are formed, because education as a profession implies leadership, and because no teacher is excluded from leading in some capacity. Even though, at the heart of the profession, teachers are expected to perform immediately upon entering the workforce at a high level of success, many first year teachers may not be prepared to lead. According to Bond (2011), this is a compelling reason for pre-service teachers to have training in leadership from the beginning of the teacher education program.

As well as training pre-service teachers to be teacher leaders, universities are striving to teach professionalism to pre-service teachers. Chung and Kim (2010) note that educational reform in the United States, because of a focus on teacher performance, has resulted in forming professional teaching standards which establish a level of knowledge and ability for pre-service/new teachers. Within the framework of this study, Chung and Kim (2010) found that at the beginning of the pre-service teaching program, pre-service teachers conceptualized these professional teaching standards in the form of a checklist with items to be completed and

checked off. Throughout the program, the pre-service teachers learned to connect teaching to the specific standards, but still lacked the understanding of how the standards could shape professional growth. The pre-service teachers struggled with how to demonstrate understanding of the standards within the construct of instruction (Chung & Kim, 2010).

Goldhaber and Liddle (2012) point out that there are a number of teachers who are now entering the educational system through alternative licensure routes. These authors propose that changing the way teachers are selected for a specific job or how a teacher is trained could have significant influence on the educational workforce. The premise presented is that the quality control available within the teacher education systems is inadequate and ineffective. To have a significant influence on the educational workforce, there needs to be a change in how candidates in traditional teacher training programs are selected and how they are prepared to enter the workforce (Goldhaber & Liddle, 2012). Levine (2006) notes the large degree of disparity between teacher education programs and suggests that many of the weak teacher education programs have been able to gain support and accreditation because of the current quality control guidelines. Furthermore, Goldhaber and Liddle (2012) found that effectiveness of teachers is best assessed through actual performance in the classroom than through pre-service credentials.

Much of the existing literature and research related to teacher preparation focuses on whether teachers who enter education through traditional routes are more or less effective than teachers who enter through alternative routes (Glazerman, Mayer, & Decker, 2006; Shuls, 7 Trivitt, 2015; Xu, Hannaway, & Taylor, 2007). Researchers have recently begun to examine the link between teacher education/training and student achievement (Boyd, Grossman, Lankford, Loeb, & Wyckoff, 2009; Henry et al., 2011). Another concern for educators is how to handle academic stress among students. Both pre-service and inservice programs work to prepare

teachers for how to deal with students who display stress. Onchwari (2010) found that there was no significant difference between pre-service teachers and inservice teachers perceptions of how to handle student stress in the classroom. This study concludes that both pre-service and currently working teachers need specific programs to prepare teachers in how to deal with academic stress among students (Onchwari, 2010).

Harris and Sass (2011) note that many of the recent studies relate teacher training based on experience or attainment of graduate degrees to student achievement. These studies show little to no significant relation to improvement in student achievement. A few studies focus on the relationship between pre-service teacher training and teacher productivity or student achievement. There is some debate on how to train pre-service teachers – easing the candidate slowly into the educational arena through experience or simply providing a high quality education (Boyd et al., 2009). Only one study, by Boyd et al. (2009), shows some significance between the productivity of the teacher and various specific elements of the teacher education program. This study finds that preparing teachers for the actual work of the classroom greatly affected student achievement, as did content knowledge. A study of French pre-service programs focused on a condensed or autonomous classroom placements. The researchers suggest that in order to produce effective teachers, pre-service programs need to incorporate learning with practice. In this program, pre-service teachers worked alongside of the classroom coordinating teacher, entering the classroom one to two times a week over the entire year prior to certification, with the other days devoted to instruction with the university professors (Chaliès, Bruno-Méard, Méard, & Bertone, 2010).

In the study by Harris and Sass (2011), the researchers conclude that teacher effectiveness increases more through experience than through formal training, especially

experience early in the career. This research also found that graduate studies and attainment of degrees did not improve teacher effectiveness as measured by student achievement, with the exception of middle school math teachers. Reading is the only course in which undergraduate coursework appears to affect later effectiveness of the educational professional (Harris & Sass, 2011).

Sanger and Osguthorpe (2011) examine through their study what they call the "moral work of teaching." This moral work of teaching is the elements of teaching that include or are connected to a moral domain, that which is good or right. This theory of the moral work of teaching included the teacher being what is considered a morally good person and the effects this has on the ability to teach and the development of students. Sanger and Osguthorpe (2011) argue that teaching, at its core, is moral in nature and therefore beliefs related to the moral work of teaching should be included in pre-service teacher education.

Teacher Certification

Kane, Rockoff, and Staiger (2008) analyzed the effectiveness of initial certification on student achievement as evidenced in test performance. The study found that there was little significance between initial certification and teacher effectiveness. The area of initial certification did not appear to have a significant effect on student achievement. This finding was supported by research from Shuls and Trivitt (2015). Kane et al. (2008) also found that a more reliable indicator of teacher effectiveness is that teacher's classroom performance, just as did Harris and Sass (2011). A study conducted by Wiens and Ruday (2014) addressed the idea that some people are predisposed to being a teacher. This study focused specifically on the personality of pre-service teachers. It was found in this study that personality does not change over the course of a teacher education program. However, it was also determined that

personality was not a good predictor of teaching performance but that there was a significant relationship between personality and career satisfaction (Wiens & Ruday, 2014).

In 2001, Fetler conducted a study of California schools. At this time the schools in California were experiencing a large shortage of qualified teachers and, in turn, the state department of education granted several vouchers to allow unqualified teachers to work in the schools on a probationary basis. In his study, Fetler (2001) discovered that teacher preparation for the job and teacher experience related positively to student achievement. The teachers who were unqualified did not show the same amount of academic growth as teachers who were qualified and had greater educational experience. While many of the schools with underprepared teachers had a high poverty demographic, the author found that teacher education and experience was more influential on student achievement than poverty (Fetler, 2001). In contrast, the study by Buddin and Zamarro (2009) that measured teacher attributes to student achievement found that there is little correlation between the type of degree or the type of certification held by a teacher, although this study did not specify whether any of the teachers observed were unqualified. One study contradicted the majority, providing evidence that the GPA of a teacher, as well as the number of course hours in mathematics and math education did have an impact on student achievement (Kukla-Acevedo, 2009).

One tool widely utilized by educators to demonstrate content knowledge is national board certification through the National Board for Professional Teaching Standards (NBPTS). In 2009, Harris and Sass conducted a study to determine the effective of national board certification in relation to student achievement. The authors of the study deviated from form by studying the same teachers prior to and following national board certification, essentially comparing them to themselves. Previous studies had compared national board certified teachers to non-national

board certified teachers. There was evidence from these previous studies to indicate that students of national board certified teachers had greater achievement than students of non-national board certified teachers. This study, however found that there was little increase in student achievement prior to or following national board certification. By evaluating these same teachers over the course of time, the authors were unable to determine a significant increase in student achievement (Harris & Sass, 2009).

Tchoshanov (2011) conducted a study that examined whether content knowledge was associated with student achievement and teaching practice. This study found that there is a positive connection between teacher content knowledge and student achievement. Students who were taught by these teachers scored higher on standardized tests than students in other classrooms, leading the researcher to conclude that content knowledge does have a positive impact on student achievement. Also, it was found that teachers with greater content knowledge were more conceptual in teaching style when compared to teachers with less content knowledge (Tchoshanov, 2011). With a renewed emphasis on non-traditional certification routes in education, many new teachers enter the classroom with none to little pedagogical preparation but with a degree in the field of study (Wiseman, 2012).

Some researchers claim that student achievement is directly linked to a teacher's preparation, content knowledge, and delivery of instruction. There has been found, through research, that the majority of teachers entering the educational workforce do not enter the profession already at a high level of effectiveness, even those with a strong academic background (Goldstein & Noguera, 2006). Achieving a high level of effectiveness takes years of experience. NCLB has caused many school districts to adopt new teacher mentoring programs

and intensive in-service programs for teachers in order to increase this content knowledge, which in turn would increase student achievement (Goldstein & Noguera, 2006).

In-service Training

Foster et al. (2013) studied the effect of in-service programs on teachers in Kentucky, Tennessee, and Virginia. The school districts participated in the Appalachian Math and Science Partnership. The partnership provided professional development programs for teachers specifically in the areas of math and science. Teachers participated in these professional development programs and student achievement was measured. The study determined that this focused professional development did show positive results in the area of math scores, but no change in science (Foster et al., 2013). Some studies have shown that in-service training at the elementary level has little to no significant impact on student achievement in reading or math (Jacob & Lefgren, 2004). One study specifically showed that the most effective professional development included hands-on activities along with collaboration with peers and time to reflect on what was learned (Ross, 1994).

Other studies show that professional development, or in-service, produces positive results in student achievement. In one study, conducted by Adams (2008), the idea that regular education students would benefit from the same type of advanced learning as gifted education students was explored. The regular education teachers were given the same in-service training as the gifted education teachers and had access to the same resources as these teachers. It was hypothesized that regular education students would show increased achievement from this teacher training as evaluated by pre- and post-test scores. Students did show increased performance based on the new teaching strategies learned during the professional development.

The teachers involved in the study agreed with the researcher that the training improved teaching skills and strategies and led to positive outcomes for both students and teachers (Adams, 2008).

While many of the studies on inservice training focused on the benefit to student achievement, Powell-Moman & Brown-Schild (2011) conducted a study of a science inservice program that centered on a scientist-teacher partnership. Teachers who participated in this program reported an increase in self-efficacy specifically toward inquiry-based instruction and depth of content.

Social Cognitive Theory/Teacher Self-Efficacy

Student achievement has been linked to teacher self-efficacy. Self-efficacy is the teacher's belief about his own ability to engage all students in learning (Bandura, 1977). These beliefs are determined by how the teacher feels, behaves, thinks, or self-motivates (Bandura, 1994), while Tschannen-Moran, Woolfolk, and Hoy (1998) define perceived self-efficacy as an internal belief pertaining to the ability to produce a specific outcome. Bandura roots his self-efficacy beliefs in his social cognitive theory, which examine the capacity of humans to "exercise control over the nature and quality of one's life" (Bandura, 2001, p. 1). In this theory, self-efficacy critically influences an individual's behavior and influences all aspects of decision making and outcome production through intentional actions (Bandura, 1986). This exercise of control, according to Bandura (2001) is guided through four cognitive outlets. The first is intentionality. This is the human ability of choosing a course of action. Second is forethought; setting of goals, anticipating possible consequences, and choosing the action most likely to provide the desired outcome. Thirdly, self-regulation refers to the influence a person has over their own motivation, their own thought process, their own emotional state, and their own pattern of behavior. Lastly, self-reflection in which a person is able to make sense of an experience,

engage in evaluation of how the task has been handled, and alter thinking and behavior accordingly. According to Bandura (2001), efficacy beliefs can shape the path a life takes by having an influence on choices made and the direction of personal development.

Bandura's Social Cognitive Theory also distinguishes between three different modes of human agency. These three modes are direct personal agency, proxy agency, and collective agency (Bandura, 2001). Direct personal agency is the idea that a person has "direct control over the social conditions and institutional practices that affect their everyday life" (Bandura, 2001, p. 13). Proxy agency is the idea that a person relies on others to perform actions on their behalf in order to secure the desired outcome. Collective agency relies on a shared belief that collectively a group can produce a desired outcome (Bandura, 2001).

Self-efficacy, as set forth by this theory, influences all aspects of life and decision making; goal setting, motivation, ability, and interest. A person who believes they can complete a specific task with the desired result, that person will set the appropriate goals to complete the task, be fully committed and motivated to complete the task, be aware of whether he has the ability to adequately complete the task, and an interest in the outcome of the task (Swackhamer, 2009). It is of interest that while a person may have a high level of self-efficacy for a task, but may still lack motivation to complete said task. Two people may have the same ability and skills to complete a given task, they may perform the task with varying degrees of success if their perceived level of efficacy differs significantly (Bandura, 1993).

Bandura (1997) proposes four different sources of self-efficacy beliefs. Master experiences are the actual outcome of a specific task, whether successful or unsuccessful. These are considered the most influential on a person's self-efficacy. Vicarious experiences are those experiences where another person who is believed to be of the same ability level performs a

similar task. Social persuasion refers to when a more knowledgeable person encourages someone to perform a specific task. Physiological and affective states pertain to the mental and physical processes that may or may not interfere with the outcome of the task. These, according to Bandura (1997), can also be affected by cognitive, motivational, affective, and selection processes. Cognitive is the acquisition, organization, and use of information. Motivation is seen through the intensity and persistence in the effort to perform the task at hand. Affective processes are the emotional reactions. Selection processes refers specifically to the choices made in specific situations (Bandura, 1997). It is important to remember that self-efficacy is generally not an issue when performing routine tasks or tasks where success has been previously established, but can be highly important when confronting tasks that require a new set of skills (Bandura, 1997).

With a global perspective being at the fore-front of many educational issues today, it is important to be aware of how cultural differences may or may not affect self-efficacy beliefs. In 2002, Bandura explored the concept of his social cognitive theory and self-efficacy in a cultural context. He found that self-efficacy is a universal concept that is valued across cultures, whether that culture be individualistic as is the United States or collective as in Asian cultures. Bandura (2002) found that differences within cultural groups were as large as differences between cultural groups.

In 1997, Bandura notes the importance of self-efficacy in science education because of the increased technological advances in the global community. Bandura (1977, 1986) also mentions that teaching self-efficacy is specific to the context, not limited to a global trait. However, it is important to note that the level of self-efficacy may change within varying contexts, for example self-efficacy may be higher with higher ability students and lower with

lower ability students (Bandura, 2007). As research began to show that self-efficacy is context specific, scales began to be developed that focused on specific area of content instead of simply a general teaching efficacy scale, such as Enochs, Smith, and Huinker's (2000) Mathematics Teaching Efficacy Beliefs Instrument (MTEBI) and Reading Teaching Efficacy Instrument (RTEI) by Szabo and Mokhtari (2004).

Teachers of literacy should have high self-efficacy in literacy, math in math, etc. In order for a teacher to be effective in teaching math or science, then the self-efficacy should be specific to the subject being taught (Richard, 2013). Alper (2014) interviewed pre-service teachers asking specifically how they would go about teaching reading to which the respondents answered they had no idea. When Alper (2014) subsequently asked a university professor if pre-service teachers were taught how to teach reading, the response was a definitive no. This professor answered that it was the responsibility of the school district.

A study of pre-service science teachers in the Netherlands found that effective training of these teachers positively affects personal self-efficacy (Velthuis, Fisser, & Pieters, 2014). According to the research, teachers who possess a high level of self-efficacy will be more adaptive in the classroom, engage students in classroom discussion, and respond to students in a more positive manner than teachers with a low level of self-efficacy (Tschannen-Moran, Woolfolk Hoy & Hoy, 1998).

One way to increase teachers' levels of self-efficacy could be to offer content courses that are designed with the intent to support development of content knowledge. In 2009, Swackhamer, Koellner, Basile, and Kimbrough conducted a study to determine if participation in these types of in-service courses caused a change in the teacher participants' levels of self-efficacy. The participants in this survey were mainly teachers with 15 or more years of

educational experience but who lacked sufficient content knowledge to be considered highly qualified. Even though these teachers had been teaching in their field for many years, the level of content knowledge was low. The researchers found that these teachers' self-efficacy was increased in those who took four or more content area courses. The increased level of self-efficacy among these participants allowed these teachers to more adequately reach all students (Swackhamer et al., 2009).

Supporting the research of others in self-efficacy, Newton, Leonard, Evans and Eastburn (2012) substantiated that there is a significant positive correlation between content knowledge and personal teaching efficacy, specifically in the field of mathematics. This study did find that vicarious experiences were more important to pre-service teachers with low math content knowledge while those with moderate math content knowledge benefited more from verbal persuasion. Those with high math content knowledge had a greater likelihood of making connections between pre-service experiences and future teaching experience. Mastery experiences had high importance for all levels of math content knowledge (Newton et al., 2012).

In her research, Lively (1994) suggests that pre-service teachers should not assume that everything needed to understand how students learn will be covered in teacher education classes. Because of the rule of social cognitive theory and self-efficacy, pre-service teachers enter the teacher education program with preconceived ideas of teaching, both accurate and inaccurate. As they proceed through the teacher education program, the level of self-efficacy is subject to change as pre-service teachers are presented with practice in a real classroom (Lively, 1994). And "because student teaching is the major opportunity for the prospective teacher to actually do teaching, self-efficacy theory may be especially applicable to this phase of professional preparation" (Lively, 1994, p. 6). Previous self-efficacy expectations have been based primarily

on vicarious experiences or limited practical experiences. This aspect of teacher training allows the pre-service teacher the opportunity to directly teaching, thereby confirming or denying the self-efficacy perception (Lively, 1994). Miller, Thompson, and Xu (2012) found that through field experience and course discussion of the field experiences, elementary pre-service teachers showed an increase in efficacy in dealing with students, specifically adolescent students.

Because of the field experience and course discussion the pre-service teachers studied attained "a greater understanding of the unique developmental characteristics of young adolescents, positive interactions with students, and positive observational experiences with cooperating teachers" (Miller, Thompson, Xu, 2012, p. 23).

Some research implies that self-efficacy towards teaching has the ability to change once the pre-service teacher has mastered the first part of self-efficacy, performance experience (Boyd, Foster, Smith, & Boyd, 2014). Self-efficacy also will increase as the pre-service teacher receives more training and gains more experience actually teaching within the content area. Self-efficacy is positively affected when the pre-service training has a great deal of scaffolding, leading to actual experience (Rogers-Haverbach & Mee, 2015). Pre-service teachers who simply have clinical training with little to no practical application may have an inflated self-efficacy which can lead to frustration and a lowering of self-efficacy upon entering the field of education, according to Rogers-Haverback and Mee (2015). Gunning and Mensah (2011) also found that a combination of instruction, combined with meaningful assignments and discussion, followed by mastery experiences provided powerful learning experiences for pre-service teachers which increased teaching self-efficacy in specific content areas. The self-efficacy of pre-service teachers who have spent a limited amount of time within the context of the classroom can be predicted based on personality traits and beliefs. Pre-service teachers who rated as more out-

going and less anxious reported having a higher level of self-efficacy (Jamil, Downer, & Pianta, 2012). As with other studies that focused on whether pre-service teachers' confidence (self-efficacy) would rise when exposed to a teacher education program that included authentic teaching opportunities, Flores (2015) found significant gains in self-efficacy with participants in the study. One interesting difference in this study was the fact that pre-service teachers were placed onsite at a local school for the science coursework and professional development along with the practical teaching experiences (Flores, 2015).

A high degree of self-efficacy is important in novice teachers as those with higher self-efficacy have a higher likelihood of remaining in the teaching profession (Knobloch & Whittington, 2002). While a quality teacher education program is vital in preparing novice teachers to enter the field of education, that is not the only component that is important to boosting the self-efficacy of pre-service or novice teachers. McLennan, McIlveen and Perera (2017) found that pre-service teacher self-efficacy is directly related to that teacher's career optimism and can have an effect on whether they will be adaptable within that career, and recommend that pre-service coursework should include developing that self-efficacy in order to promote optimism and adaptability. A positive student teaching experience is also important, combined with the desire of cooperating teachers and instructional leaders working to develop a sense of collective efficacy with these pre-service/novice teachers during the beginning weeks of the school year, thereby allowing the pre-service/novice teacher to feel a sense of being part of a supportive team working together toward a common goal (Knobloch & Whittington, 2002).

Rahman et al. (2011) notes that student achievement is a combination of the student and the teacher, both contributing to learning. Teachers with a positive attitude toward the subject matter and toward the educational process are more effective in increasing student learning.

Rahman et al. (2011) continues that the self-efficacy of the teacher, the confidence that the teacher is able to facilitate effective student learning, increases student achievement. However, it is difficult to isolate one specific variable in the relationship between teacher effectiveness and student achievement. While research on one particular variable of teacher training does show a significant impact on student achievement, other variables should not be neglected in the overall scope of teacher effectiveness (Rahman et al., 2011).

Haverback and Parault (2011) conducted a study of the reading self-efficacy of pre-service teachers who participated in one of two field experiences, tutoring or observation. Subjects of the study participated in one of the two experiences and were tested on their self-efficacy three times through the experiment. Haverback and Parault (2011) discovered that the pre-service teachers who participated in the observation had a more significant change in reading efficacy than did the tutoring group. The observation group was able to observe veteran teachers interacting with students, which may have lead participants to the conclusion that motivating, instructing, and assessing students is easier than it is in actuality (Haverback & Parault, 2011). Upon interviewing the participants, Haverback and Parault (2011) found that while the observation group reported a greater increase in self-efficacy, the tutoring group felt that the experience contributed more greatly to their feeling of reading self-efficacy. Swackhamer (2009) determined that strong mentoring/coaching programs can provide new teachers with the necessary support and guidance to increase self-efficacy, although these programs may not be sufficient for every teacher. This study found, however that many of the mentors/coaches were not consistent in communication therefore effectively undermining the value of the program.

A study conducted by Oh (2011) evaluated pre-service teachers' self-efficacy at the beginning and the end of literacy methods courses in the teacher education program at a

Midwestern university. The purpose of this study was to determine if there were any specific potential sources of the pre-service teachers' personal perception of efficacy. The study found that some potential sources of the pre-service teachers' self-efficacy, included personality traits, skills, and motivation. These findings point to the importance of pre-service teachers' pre-existing conditions as affecting their teaching self-efficacy (Oh, 2011). Cantrell, Young, and Moore (2003) looked at the efficacy of pre-service science teachers. The researchers found that there was a disparity between the genders, possibly due in part to the fact that males took more science courses in high school and participated in extracurricular science activities than females. The same study found that spending time preparing and teaching science lessons positively affected teaching self-efficacy in these teachers (Cantrell et al., 2003). It is important to remember that literacy is not the only subject being taught by elementary teachers. Elementary teacher education programs need to balance learning opportunities among all disciplines, including literacy, mathematics, sciences, and history (Swackhamer, 2009).

Some research suggests that teacher self-efficacy research on this alone is not sufficient, but that this research should be combined with research into teacher beliefs in order to provide a greater understanding of the topic and produce more meaningful research (Wheatley, 2002, 2005). Labone (2004) also suggests that this topic be broadened in order to understand the construct more deeply, extending the research beyond traditional teacher roles. The reason behind this broadening of the research is because, as noted by Wheatley (2002), a teacher who is overly confident in her ability to effectively impart knowledge to her students may not recognize that there is a need for continued learning.

Anxiety

There is evidence that anxiety is one factor that can impair a teacher's performance in a variety of tasks (Bilali, 2014). According to Akhter, Kanwal, Fatima, and Mahmood (2016), specifically pre-service teacher experience anxiety specifically from lesson planning, disruptive behavior of students, working with the cooperative teacher and visits by the university supervisor. It was noted in the study that the level of anxiety decreased by interacting with students, teachers and the university supervisor (Akhter et al., 2016).

Ngidi and Sibaya (2003) note that pre-service teachers, or practice teachers, across the world suffer from some form of teacher anxiety, in particular about evaluation. Based on their research, Ngidi and Sibaya (2003) suggest that pre-service teachers could be relieved of some anxiety by knowing precisely what is expected of them in regards to evaluation along with frequent demonstrations from supervisors. A study by Gresham (2009) found that pre-service teachers who received feedback and observed others teaching had greater overall growth and development. In contrast, a study conducted by Munday and Windham (1995) discovered that specific training in stress management did not significantly reduce the level of anxiety for pre-service teachers.

Another area of anxiety for pre-service teacher anxiety is related to classroom management. When a teacher enters a classroom, the teacher must be aware of everything going on inside of that environment while continuing to teach. In order to maintain the highest level of learning possible, the teacher must learn to manage the classroom effectively (Oral, 2012). According to Oral (2012), effective classroom management is characterized by minimization of misconduct and effective intervention when misconduct occurs while maintaining academic

engagement of all students. Striving to achieve this balance can impact the level of anxiety in pre-service teachers.

Also increasing the level of anxiety for pre-service teachers is the concept of teaching a diverse classroom, including students with disabilities. Some research has found that pre-service teachers felt unprepared to work in a classroom that included one or more students with disabilities (Cook, 2002). Everhart (2009) found that pre-service teachers with training involving students with disabilities felt lower levels of anxiety in working with these students.

A large portion of the research into teacher anxiety and specifically pre-service teacher anxiety has been focused on mathematics anxiety. Mathematics anxiety can be defined as "a feeling of helplessness, tension, or panic when asked to perform mathematics operations or problems" (Gresham, 2007, p. 182). This can be interpreted as a deficiency in application along with a dread of mathematics (Bursal & Paznokas, 2006; Gresham, 2004). Mathematics anxiety has the ability to affect not only the pre-service teacher but also the success of their future students (Malinsky, Ross, Pannells, & McJunkin, 2006). Sloan and Giesen (2003) found that pre-service teachers with a global learning style had higher levels of mathematics teaching anxiety. This was attributed to the idea that global learners look at the big picture and view things intuitively while mathematics is very direct, focused on finding the one correct answer (Sloan & Giesen, 2003).

Gresham (2004) conducted research that allowed pre-service teachers to participate in a mathematics methods course and measured anxiety prior to and following the course. Participants were varied but many participants demonstrated a greater confidence and decreased anxiety towards teaching mathematics following this course (Gresham, 2004).

One of the theories posited by researchers for lower math scores is the anxiety of mathematics teachers. Math anxiety does not denote simply a dislike of mathematics but a state of discomfort in teaching mathematical concepts. Teachers with high math anxiety tend to use more traditional teaching skills, such as lecture, will avoid teaching mathematics, and will translate this negative attitude to their students (Swars, Daane, & Giesen, 2006). Bursal and Paznokas (2006) state that pre-service elementary teachers largely have negative attitudes towards math and science because of a lack of knowledge in the subject area. These pre-service teachers lack the experience needed to decrease the anxiety of teaching mathematics. Gresham (2009) also noted negative attitudes, especially in pre-service teachers with the highest levels of anxiety, while pre-service teachers with lower levels of anxiety demonstrated more positive attitudes.

Math anxiety begins in the elementary classroom, where negative experience with math can lower a student's confidence in mathematic ability (Isiksal, Curran, Koc, & Askun, 2009). This causes increased anxiety where math and math related situations are concerned, which results in students avoiding math classes and mathematics related situations. Teachers who themselves suffer from math anxiety will also seek to avoid situations where math is key, causing the teacher to spend less time planning and preparing for math instruction. Because teachers who experience math anxiety spend fewer hours preparing for math instruction and planning for math related activities, students of this teacher have fewer opportunities to overcome their own math anxiety (Isiksal et al., 2009). Steele, Brew, Rees, and Ibrahim-Khan (2013) found that about 30% of pre-service teachers included in their study displayed stress about teaching mathematics and/or science and also acknowledged having either negative or neutral experiences in the mathematics or science classroom during school.

After his study on teaching math anxiety, Liu (2008) notes that a crucial link in reducing mathematics anxiety is in open discussion of this topic and suggests that universities add a specific course targeting teaching anxiety, specifically in regard to math, to minimize the anxiety the teacher feels and ultimately the anxiety of the student. It was also found that engaging pre-service teachers in discussion that specifically targets mathematics anxiety can significantly reduce the amount of mathematics anxiety experienced by these teachers. This finding was supported by the research of Boyd, Foster, Smith, and Boyd. (2014). In this study, it was found that pre-service teachers' anxiety was affected by held beliefs regarding mathematics, both external, the perceptions of past teachers, and internal, someone is good at math or they are not. Pre-service teachers who experienced quality teaching in mathematics were more positive toward teaching mathematics themselves, while pre-service teachers who struggle with mathematics and suffer from high levels of mathematics teaching anxiety experienced poor teaching practices (Boyd, et al., 2014). Research by Sloan (2010) also supports these findings. In this study, pre-service teachers experienced a significant decrease in mathematics teaching anxiety after participation in a mathematics teaching methods course. A decrease in levels of anxiety was also found when pre-service teachers received instruction that included modeling of effective teaching practices (Sloan, 2010).

Teacher anxiety is closely related to the expectation of the teacher to be able to effectively deliver the material. Bursal and Paznokas (2006) relate teacher anxiety to Bandura's theoretical framework, suggesting that the first few years of a teacher's experience can be critical to a teacher's efficacy. These first years form the foundation on which the teacher will base their future perceptions of the subject matter being taught and the level of anxiety that causes (Bursal & Paznokas, 2006). Acknowledging the anxiety of pre-service teachers has been shown

as an effective tool in addressing that anxiety (Boyd et. al, 2014). Boyd et. al (2014) note that it would be useful to continue to monitor teachers throughout their first four years of teaching to determine if growth and experience lessen anxiety. Also important to note is that if a teacher candidate graduates with a high level of anxiety, that teacher is more likely to pass this anxiety on to the students they will ultimately teach (Daniels, Mandzuk, Perry, & Moore, 2011)

Daniels et al. (2011) studied how pre-service teachers' perceived the university's education program prepared them for teaching and how this affected the level of anxiety and self-efficacy as well as the commitment to the teaching profession. This research determined that classes on teaching ethics and opportunities to explore this topic helped to reduce anxiety and increase efficacy and commitment. Based on this research, it was determined that a mixture of courses that focus on instruction, assessment, development, and reflection on current practices and experiences will likely increase the level of self-efficacy held by the pre-service teacher (Daniels, et al., 2011). Hudson (2012) found in his research that beginning teachers, those teachers recently out of the teaching training program and just beginning in the classroom, desired further instruction and support on how to set up the classroom and how to assess students throughout the year within this more practical setting. He also found that university teacher training programs needed a greater number of courses in literacy, numeracy (mathematics), and how to relate to students living in poverty. It was suggested by this study that universities may want to consider expanding support of those beginning teachers throughout the first few years of actual classroom instruction (Hudson, 2012).

West (1994) conducted a survey that investigated the anxiety level of pre-service science teachers before and after student teaching. The study sought to determine if student teaching affected pre-service elementary teachers' attitude and anxiety about teaching science. This study

found that both the attitude of the pre-service teacher and the anxiety about teaching science in the elementary classroom were affected positively by the experience of student teaching (West, 1994).

Summary

The body of literature examined lays a considerable foundation for the examination of the relationship between preparedness in literacy and mathematics and the level of anxiety felt by pre-service teachers and the level of self-efficacy in each discipline. Studies on levels of anxiety and self-efficacy of teachers set the stage for further research specifically focused on pre-service teachers and pre-service preparedness. Gaps in the research literature indicate a need to address the correlation between pre-service teachers' anxiety and self-efficacy prior to full-time employment.

Chapter Three will present the research procedures and design that will be used to investigate the relationship between number of course hours (preparedness) in literacy and mathematics and pre-service teacher anxiety and self-efficacy. The knowledge gained from this study is designed to contribute to the growing body of literature and provide universities and other teacher-training institutions with the knowledge to drive pre-service teacher instruction with the aim of enhancing teacher education and produce more effective and knowledgeable teachers.

CHAPTER THREE: METHODS

Overview

Chapter three describes the research design and methodology used in this study to determine if a correlation exists between the number of course hours a pre-service teacher takes in literacy and mathematics and pre-service teacher anxiety and whether the level of anxiety affects self-efficacy in teacher literacy and mathematics, along with the research questions and null hypothesis. The chapter includes a description of participants and the setting for the study, the instrumentation used to collect data and data collection procedures. The chapter concludes with a description of the data analysis procedures that were conducted.

Design

A correlational research design will be utilized to examine the relationships between the number of hours a pre-service teacher takes in literacy and the teacher's teaching anxiety, the number of hours a pre-service teacher takes in mathematics and the teacher's teaching anxiety, and this level of teaching anxiety and the self-efficacy of the pre-service teacher to teach literacy and mathematics. Correlational study was chosen for this study as it is the appropriate tool for determining if a viable relationship exists between two variables. Correlational research design is also appropriate because there is no treatment applied by the researcher for this study to take place, no manipulation of the variables (Gall, Gall, & Borg, 2007). The researcher is only concerned with the relationship that may exist between the variables. The predictor variables are the number of course hours taken in literacy and mathematics. The criterion variables are the anxiety levels as perceived by the student teacher and the self-efficacy levels as perceived by the student teacher.

Research Questions

The study was designed to answer the following research questions.

- RQ1** – Is there a relationship between the number of college course hours a per-service teacher has taken in literacy and that teacher's teaching anxiety?
- RQ2** – Is there a relationship between the number of college course hours a pre-service teacher has taken in mathematics and that teacher's teaching anxiety?
- RQ3** – Is there a relationship between the anxiety level the pre-service teacher feels in literacy and that teacher's teaching self-efficacy?
- RQ4** – Is there a relationship between the anxiety level the pre-service teacher feels in mathematics and that teacher's teaching self-efficacy?

Null Hypotheses

The study was designed to test the following null hypotheses.

- H₀1** – There is no statistically significant correlation between the number of college hours a pre-service teacher has taken in *literacy* and the level of teaching anxiety, as measured by the Teaching Anxiety Scale.
- H₀2** – There is no statistically significant correlation between the number of college hours a pre-service teacher has taken in *mathematics* and the level of teaching anxiety, as measured by the Teaching Anxiety Scale.
- H₀3** – There is no statistically significant correlation between the level of teaching anxiety as measured by the Teaching Anxiety Scale and literacy self-efficacy of the pre-service teacher as measured by the Reading Teaching Efficacy Instrument (RTEI).

H₀₄ – There is no statistically significant correlation between the level of teaching anxiety as measured by the Teaching Anxiety Scale and mathematics self-efficacy of the pre-service teacher as measured by the Mathematics Teaching Efficacy Beliefs Instrument (MTEBI).

Participants and Setting

Participants for this study were selected from the student teaching portion of the teacher-training program at four local state and private universities in Mississippi and Alabama during the time of the study. All students participating in the student teaching program were asked to participate and were provided the opportunity to opt out if desired. The study was conducted during the student teaching portion of the university program and a consent to participate/decline to participate was provided at this time.

The sample size was 68 pre-service teachers, based on enrollment at each university at the time the study took place. The number of participants invited to participate in the study varied by university depending on the number of pre-service teaching students enrolled in the student teaching portion of the teacher-training program at each university at the time of the study. The universities did not supply the number of emails that were distributed to the sample population. According to Gall et al. (2007, p. 145), this is a sufficient sample for a medium effect size with statistical power of 0.7 at the 0.05 alpha level.

Only pre-service teachers in the elementary education program were included in the study. The age and gender of participants varied based on enrollment in the student teaching block of the teacher-training program at the specified universities. Based on the demographics for the two universities, it was anticipated that there would be a larger number of females who would participate in the study than males. It was also anticipated that there would be an

equitable number of white and African American participants, again based on the university demographics.

The College of Education at the first university, located in Mississippi, is accredited through the National Council for Accreditation of Teacher Education (NCATE). The university has a somewhat diverse population, averaging approximately 70% white, non-Hispanic enrollment, 21% black or African American, and the remaining 9% being other ethnicities. The enrollment at the university is approximately 50/50 male and female (Bailey, 2012).

The College of Education at the second university is located in Alabama and is accredited through the National Council for Accreditation of Teacher Education (NCATE). This university has a slightly more diverse population, with approximately 44% white, 43% black or African American, and the remaining 13% being other ethnicities. There are significantly more females than males at this university, with females making up 75% of the population and males 25% (University of West Alabama, 2012).

The third university is located in Mississippi. The College of Education at this university is also accredited through NCATE. The diverse population of this university include 31% African American, 1% Asian or Pacific Islander, 3% Hispanic, 59% white, and 3% other ethnicities. There are significantly more females than males with 62% female and 38% male (Forbes, 2015).

The fourth university is a small private university also located in Mississippi. The School of Education at this university is accredited through NCATE, as with the other participating universities. The diverse population of this university include 60% white, 31% black, and 7% being from other ethnicities. The female population is significantly higher at this university with 63% being female and 37% being male. (William Carey University, 2017).

Subjects who participated in the study consisted of 68 pre-service teachers (80.9% female, $n = 55$). The participants were primarily white (69.1%, $n = 47$), but also consisted of African-Americans (16.2%, $n = 11$), American Indian or Alaskan Native (1.5%, $n = 1$), Asians (2.9%, $n = 2$), and participants from multiple races (8.8%, $n = 6$) or some other race (1.5%, $n = 1$) (Table 1). As this was a blind study, participants were not required to answer at which university they were enrolled. The universities did not share with the researcher the actual number of emails distributed.

Table 1

Demographic Characteristics of the Sample

	N	%
<i>Gender</i>		
Male	13	19.1
Female	55	80.9
<i>Age</i>		
18-20 years old	5	7.4
21-29 years old	38	55.9
30-39 years old	15	22.1
40-49 years old	5	7.4
50-59 years old	5	7.4
<i>Ethnicity</i>		
Asian	2	2.9
Black or African American	11	16.2
American Indian or Alaskan Native	1	1.5
White	47	69.1
Other	1	1.5
Multi	6	8.8

Instrumentation

There were three instruments used in this study. The first is the Teaching Anxiety Scale by Parsons (1973). The second is the Mathematics Teaching Efficacy Beliefs Instrument (Enochs, Smith, & Huinker, 2000). The third is the Reading Teaching Efficacy Instrument (Szabo & Mokhtari, 2004). See Appendix A for instruments. See Appendix B for permission to use instruments.

Teaching Anxiety Scale

The first instrument used in this study is the Teaching Anxiety Scale. While this instrument was designed in 1973, it has continued to be used in various studies and is considered to be one of the most effective tools to measure anxiety among teachers (Bilali, 2014). Some studies in which this instrument has been used include studies by Bilali (2014), Cheung & Hui (2011), and Al-Mehrzi, Al-Busaidi, Ambusaidi, Osman, Amat, & Al-Ghafri (2011). The scale consists of 25 items scored using a five-point Likert type scale. Participants respond by choosing one of five choices (1-never, 2-infrequently, 3-occasionally, 4-frequently, 5-always). This scale was designed to determine the amount of anxiety experienced by teachers during instruction. This scale was originally designed to be used with preservice teachers at Sanford University. Approximately half of the statements ($n = 13$) on the scale are stated negatively, with the other half being stated positively ($n = 12$). For scoring, the positively-worded items were reverse coded (i.e. change scores from 1 to 5, 2 to 4, 4 to 2, and 5 to 1). After positively-worded items were reverse coded, responses to all items are summed to create a total "Teaching Anxiety Score". This scale was validated and determined to be reliable with an alpha coefficient of 0.95 (Parsons, 1973; Bilali, 2014). This scale was validated by Parsons in 1973 and again by Bilali in 2014.

Mathematics Teaching Efficacy Beliefs Instrument

Participants were also given the Mathematics Teaching Efficacy Beliefs Instrument (Enochs, Smith, & Huinker, 2000). This instrument contains 23 items scored on a five-point Likert type scale, with response ranging from a five (strongly agree) to a one (strongly disagree). However, only 21 items are used in scoring the MTEBI. The original MTEBI started off with 23 items, but Enoch, Smith, & Huinker (2000) did a factor/item analysis and found that two of the

items had “item-total correlations less than 0.30”, which they considered “less than exemplary”. Therefore, those two items were removed from the final MTEBI scale. For scoring purposes, eight negatively worded items were reverse coded (i.e. a score of “1” becomes “5”, a score of “2” becomes “4”, a score of “4” becomes “2”, and a score of “5” becomes “1”). After responses to negatively-worded items are reverse coded, responses to all items are summed to calculate participants’ overall score on the Mathematics Teaching Efficacy Beliefs (Enochs, Smith, & Huinker, 2000).

Furthermore, two sub-scales are embedded within the MTEBI: (1) the Personal Mathematics Teaching Efficacy Belief (PMTE) sub-scale, and (2) the Mathematics Teaching Outcome Expectancy (MTOE) sub-scale. The PMTE sub-scale includes 13 items related to teachers’ personal belief in their own teaching efficacy (e.g. “I will continually find better ways to teach mathematics”). The MTOE contains eight items related to measuring outcome expectancies (e.g. “When a student does better than usual in mathematics, it is often because the teacher exerted a little extra effort”). Similarly to the overall Mathematics Teaching Efficacy score that the full scale produces, scores on each of the sub-scales can be summed to create measures of the PMTE and MTOE sub-scales (Enochs, Smith, & Huinker, 2000).

This instrument was designed to determine the level of mathematics self-efficacy felt by teachers. This was also given to the pre-service teachers during student teaching. Jansen (2008) validated the instrument and determined that it was reliable. The instrument has an alpha coefficient statistic of 0.88, which is evidence of construct validity (Jansen, 2008).

Reading Teaching Efficacy Instrument

The Reading Teaching Efficacy Instrument is the third instrument used in this study (Szabo & Mokhtari, 2004). This instrument contains 16 items, also scored on a five-point Likert

type scale, with response ranging from a 5 (strongly agree) to a 1 (strongly disagree). The instrument contains five negatively-worded items. Those items were reverse coded. Then, responses to all items was summed to create a total reading teaching efficacy score for all participants. Scores between 16 and 55 are considered “low” (i.e. No, I rarely know how to teach reading skills and strategies or how to determine what students need in order to become better readers.). Scores between 56 and 68 are “average” (i.e. Yes, I sometimes know how to teach reading skills and strategies and I can determine to some extent what students need to become better readers). Scores between 69 and 80 are considered “high” (i.e. Definitely, I know how to teach reading skills and strategies and I can determine what all students need in order to become better readers) (Szabo & Mokhtari, 2004).

Similarly to the mathematics instrument, the reading instrument consists of two subscales: (1) reading teaching self-efficacy (RTSE) and (2) reading teaching outcome expectancy (RTOE). Ten items related to teachers’ self-efficacy in teaching reading are included in the RTSE subscale, while six items related to teachers’ outcome expectancies are included in the RTOE subscale. Responses to items pertaining to each sub-scale are summed to create RTSE and RTOE scores. For the self-efficacy scale (RTSE); scores between 10 and 35 are considered “low” (Yes, I can teach reading effectively to some of my students, some of the time), scores between 36 and 46 are considered “average” (Yes, I can teach reading effectively to most of my students, most of the time), and scores between 46 and 50 are considered “high” (Yes, I can teach reading effectively to all of my students, all of the time). For the outcome expectancies sub-scale (RTOE); scores between 6 and 17 are considered “low” (No, I do not have the ability to change environmental factors in order to improve all of my student’s reading development), scores between 18 and 24 are considered “average” (Yes, I have to ability to sometimes

positively impact or counter-balance external forces in order to improve some of my student's reading development), and scores between 25 and 30 are considered "high" (Definitely, I have the knowledge to effectively teach reading to all of my students no matter what) (Szabo & Mokhtari, 2004).

As with the mathematics instrument and the anxiety scale, this was given to pre-service teachers during the student teaching portion of the teacher-training program at the appropriate university. This scale was specifically designed to measure efficacy as it relates to teaching reading. This scale is composed of two components, self-efficacy and outcome expectancy (Szabo & Mokhtari, 2004). Szabo and Mokhtari (2004) found this instrument to be valid and reliable, with a reliability alpha coefficient of 0.70.

Procedures

The researcher presented the study for approval by the Institutional Review Board prior to initiating the study. See Appendix C for IRB approval. After receiving Institutional Review Board (IRB) approval, the researcher obtained permission from the deans of the Colleges of Education at the participating universities in order to conduct the study. Upon approval by the deans of the MSU-Meridian and Colleges of Education at the participating universities, the researcher distributed electronically the informed consent form, the demographic survey, the anxiety instrument, the reading efficacy instrument and the mathematics efficacy instrument. This was done by sending the original email to the Dean of the Education department at each university, who then distributed it out to the student teaching participants. This was the prescribed method for each university, allowing for greater anonymity and keeping a higher level of privacy for the participants.

Participants were presented with an informed consent before participating in the study. Participants were given the opportunity to agree to participation in the study or reject participation in the study. By clicking on the survey links in the email, consent was inferred. See Appendix C for participant consent form. Pre-service teachers were given the Student Teacher Anxiety Scale, the Mathematics Teaching Efficacy Beliefs Instrument, and the Reading Teaching Efficacy Instrument. Participants also provided demographic information and the number of course hours they have taken in literacy and mathematics while in post-secondary course work.

Data Analysis

Candidates were provided with electronic copies of the various scales, along with a short demographic survey that included questions about the number of literacy and mathematics course hours. Each instrument was compiled into one email with links to the various instruments for each participant. The surveys were distributed through SurveyMonkey.com with no identifiers allowing for tracking of participants. The researcher employed the Statistical Package for the Social Sciences (SPSS) to calculate the descriptive statistics. For this quantitative correlational study, results from the surveys as well as the number of course hours in literacy and mathematics were compiled in one dataset in SPSS which included each of the four measures for each participant (Table 1). During preliminary analysis, means, standard deviation, and reliabilities were reported for each scale. Cronbach's alpha statistic was performed to test for reliability. Results from participants were analyzed to determine the magnitude and direction of the relationship that exists between the two variables. These assumptions were tested using SPSS. A box and whiskers box was used to determine for outliers. The assumption of normality was also tested using the Kolmogorov-Smirnov test. This test compares the distribution of the

sample data to a normal distribution. A significant Kolmogorov-Smirnov test statistic (e.g. $p < .05$) indicates that the distribution of the sample data differs significantly from that of a normal distribution, and therefore the assumption of normality is violated.

Pearson's r has been chosen as the most appropriate statistical test, providing that the necessary statistical assumptions are met. For each scale (e.g. the Teaching Anxiety scale) and sub-scale (e.g. the reading teaching self-efficacy sub-scale of the RTEI), participants' responses to all items was summed to create a total score on each scale for every participant. Then, the relationship between each participant's total score and number of course hours in literacy (and mathematics) was measured. The magnitude and direction of the relationship between the number of course hours in literacy and the Teaching Anxiety Scale was determined using a Pearson r correlation, as was the magnitude and direction of the relationship between the number of course hours in mathematics and the Student Teaching Anxiety Scale. Likewise, the magnitude and direction of the relationship between anxiety and self-efficacy in literacy and in mathematics was analyzed using a Pearson r correlation. A $p < .05$ level of significance was used for all statistical tests in the study to determine if the null hypotheses can be rejected. Pearson correlation is the appropriate statistical test for this study due to the fact that the data is quantitative and the research examined the relationship between variables, not the differences between the variables (Gall, Gall, & Borg, 2007). If assumptions are not met, non-parametric statistical tests were utilized, such as Spearman or Kendall rank order correlation.

CHAPTER FOUR: FINDINGS

Overview

Chapter four contains the findings of this study. All research questions are stated, along with the descriptive statistics and assumption testing for each hypothesis. The chapter concludes with a summary of the study results.

Research Questions

The study was designed to answer the following research questions.

RQ1 – Is there a relationship between the number of college course hours a per-service teacher has taken in literacy and that teacher's teaching anxiety?

RQ2 – Is there a relationship between the number of college course hours a pre-service teacher has taken in mathematics and that teacher's teaching anxiety?

RQ3 – Is there a relationship between the anxiety level the pre-service teacher feels in literacy and that teacher's teaching self-efficacy?

RQ4 – Is there a relationship between the anxiety level the pre-service teacher feels in mathematics and that teacher's teaching self-efficacy?

Null Hypotheses

The study was designed to test the following null hypotheses.

H₀1 – There is no statistically significant correlation between the number of college hours a pre-service teacher has taken in *literacy* and the level of teaching anxiety, as measured by the Teaching Anxiety Scale.

H₀2 – There is no statistically significant correlation between the number of college hours a pre-service teacher has taken in *mathematics* and the level of teaching anxiety, as measured by the Teaching Anxiety Scale.

H₀₃ – There is no statistically significant correlation between the level of teaching anxiety as measured by the Teaching Anxiety Scale and literacy self-efficacy of the pre-service teacher as measured by the Reading Teaching Efficacy Instrument (RTEI).

H₀₄ – There is no statistically significant correlation between the level of teaching anxiety as measured by the Teaching Anxiety Scale and mathematics self-efficacy of the pre-service teacher as measured by the Mathematics Teaching Efficacy Beliefs Instrument (MTEBI).

Descriptive Statistics

On the questionnaire given to participants, the number of course hours was coded as 1 = 3 hours, 2 = 6 hours, 3 = 9 hours, 4 = 12 hours, 5 = 15 hours, and 6 = more than 15 hours. On average, participants reported the number of literacy course hours as 3.90($SD = 1.43$), with a range from one to six. This corresponds to the mean of approximately 11.7 course hours taken in literacy teacher-training courses.

Participants in the study reported the number of mathematics course hours they had taken toward obtaining an elementary education degree. On the questionnaire given to participants, the number of course hours was coded as 1 = 3 hours, 2 = 6 hours, 3 = 9 hours, 4 = 12 hours, 5 = 15 hours, and 6 = more than 15 hours. On average participants responses were 2.97 ($SD = 1.44$), with a range from one to six. This corresponds to slightly less than 9 course hours completed in mathematics training courses. The number of course hours participants had taken in mathematics did not approximate a normal distribution (Kolmogorov-Smirnov statistics = .242, $p < .001$).

Table 2

Course hours taken in literacy and mathematics

Course Hours in Literacy	N	%
3	4	5.9
6	9	13.2
9	12	17.6
12	17	25.0

15	17	25.0
More than 15	9	13.2
Course Hours in Mathematics		
3	8	11.8
6	21	30.9
9	22	32.4
12	7	10.3
15	2	2.9
More than 15	8	11.8

Three instruments were used in this study: Teaching Anxiety Scale, Reading Teaching Efficacy Instrument, and Mathematics Teaching Efficacy Beliefs Instrument. Within the RTEI, there are two sub-scales, the Reading Teaching Self-Efficacy sub-scale (RTSE) and the Reading Teaching Outcome Expectancy sub-scale (RTOE). The sub-scales within the MTEBI are the Personal Mathematics Teaching Efficacy sub-scale (PMTE) and the Mathematics Teaching Outcome Expectancy sub-scale (MTOE).

The teacher anxiety scale consisted of 25 items. The mean total score for the teacher anxiety scale was 73.03 ($SD = 11.17$). To assess the data for outliers, a criterion of 3 standard deviations from the mean was used. Using this criterion, a score of 34.74 was removed from the analyses. Excluding the outlier, the range was fairly wide, with the lowest total score of 43 and the highest score of 103. In order to assess the internal consistency (i.e. reliability) of the Teaching Anxiety Scale, Cronbach's alpha was computed, including all items. The inter-item reliability was high ($\alpha = .925$, $n = 61$).

Self-efficacy was measured using the total Reading Teaching Efficacy Instrument (RTEI) scale scores. This instrument consisted of 16 items. The average score on the Reading Teaching Self-Efficacy scale was 56.46 ($SD = 6.77$). According to the creators of the instrument (Szabo & Mokhtari, 2004), this falls within the "average" range (i.e. Yes, I sometimes know how to teach reading skills and strategies and I can determine to some extent what students need to become

better readers). To assess the data for outliers, a criterion of 3 standard deviations from the mean was used. One outlier, a score of 26 was identified and excluded from the analysis. After removing the outlier, the data did indeed approximate a normal distribution (Kolmogorov-Smirnov statistic = .094, $p = .200$). In order to assess the internal consistency, Cronbach's alpha was computed. The internal consistency of the scale was acceptable ($\alpha = .843$, $n = 65$).

The mean score on the RTSE sub-scale was 34.84 ($SD = 5.27$). This falls within the "low" range of reading teaching self-efficacy ("Yes, I can teach reading effectively to some of my students, some of the time." Szabo & Mokhtari, 2004). No outliers were identified. The lowest score on this sub-scale was 24, and the highest score was 50. The RTSE sub-scale consisted of 10 items. For this sub-scale, the internal consistency was acceptable ($\alpha = .856$, $n = 65$).

The RTOE sub-scale consisted of six items. The mean score for the RTOE sub-scale was 21.63 ($SD = 3.04$). This falls within the "average" range of the reading teaching outcome expectancy sub-scale (i.e. "Yes, I have the ability to sometimes positively impact or counter-balance external forces in order to improve some of my student's reading development."). The internal consistency was acceptable ($\alpha = .801$, $n = 67$). The lowest score on this sub-scale was 15 and the highest score was 30.

The MTEBI consisted of 21 items. The mean score was 50.56 ($SD = 7.71$). One outlier was identified (a score of 27), and removed from analysis. The lowest score was 25, while the highest score was 69. The internal consistency of the scale was acceptable ($\alpha = .822$, $n = 62$). The PMTE consisted of 13 items. The mean score for the PMTE sub-scale was 31.31 ($SD = 7.03$). The low score on the PMTE scale was 13, while the highest score was 48.

The internal consistency measure, Cronbach's alpha, for the PMTE sub-scale was high ($\alpha = .902$, $n = 63$).

The MTOE sub-scale consisted of 8 items. The mean score for the MTOE sub-scale was 19.25 ($SD = 3.47$). The lowest score was 11, while the highest score was 26. The internal consistency for the MTOE was acceptable ($\alpha = .787$, $n = 65$).

Table 3

Descriptive statistics and inter-item reliability for all scales and sub-scales

Scale	Number of Items	Participants (n)	Mean (SD)	Range	Reliability (Cronbach's Alpha)
Teacher Anxiety Scale	25	61	73.03 (11.17)	43 - 103	.905
Reading Teaching Efficacy Scale	16	65	56.46 (6.77)		.843
RTSE sub-scale	10	65	34.84 (5.27)	24 - 50	.856
RTOE sub-scale	6	67	21.63 (3.04)	15 - 30	.801
Mathematics Teaching Efficacy Beliefs	21	62	50.56 (7.71)	25 - 69	.822
PMTE sub-scale	13	63	31.31 (7.03)	13 - 48	.902
MTOE sub-scale	8	65	19.25 (3.47)	11 - 26	.787

Results

The purpose of this research was to examine the relationship between pre-service course hours in literacy and mathematics education, and teachers' anxiety and self-efficacy in teaching reading and mathematics. The following research questions guided this study: (1) Is there a correlation between the number of college course hours a pre-service teacher has taken in literacy and that teacher's teaching anxiety? (2) Is there a correlation between the number of college course hours a pre-service teacher has taken in mathematics and that teacher's teaching anxiety? (3) Is there a correlation between the anxiety level that pre-service teachers feel in literacy and their teaching self-efficacy? And, (4) Is there a correlation between the anxiety level the pre-service teachers feel and their teaching self-efficacy? The research findings in this

chapter are based on the analyses of a sample of 68 pre-service teachers. Results pertaining to each specific research question will be reported separately.

Research Question 1: Is there a relationship between the number of college course hours a pre-service teacher has taken in literacy and that teacher's teaching anxiety?

In order to test research question 1, a correlation was computed on the total Teaching Anxiety Scale scores and the number of college course hours in literacy participants had taken. Before conducting the analysis, the data was examined for outliers and to determine whether the data was approximately normally distributed. A visual inspection of the data was performed on a box-and-whisker plot (Figure 1) and a frequency histogram (Figure 2). It appears that there was one outlier on the Teacher Anxiety Scale, with a low score of 25. Using the sample mean and standard deviation, a score of 34.74 on the Teacher Anxiety Scale would be three standard deviations below the mean. Therefore, it was determined that this outlier would be removed from the reliability and all subsequent analyses.

Furthermore, the normality of the distribution of the data may be assessed visually from the frequency distribution. The Kolmogorov-Smirnov test for normality was also computed to assess normality. The null hypothesis for the Kolmogorov-Smirnov test posits that the data are not significantly different from a normal distribution. However, the Kolmogorov-Smirnov test for the data from the current sample of teacher anxiety scale scores was significant (Kolmogorov-Smirnov statistic = .146, $p = .001$).

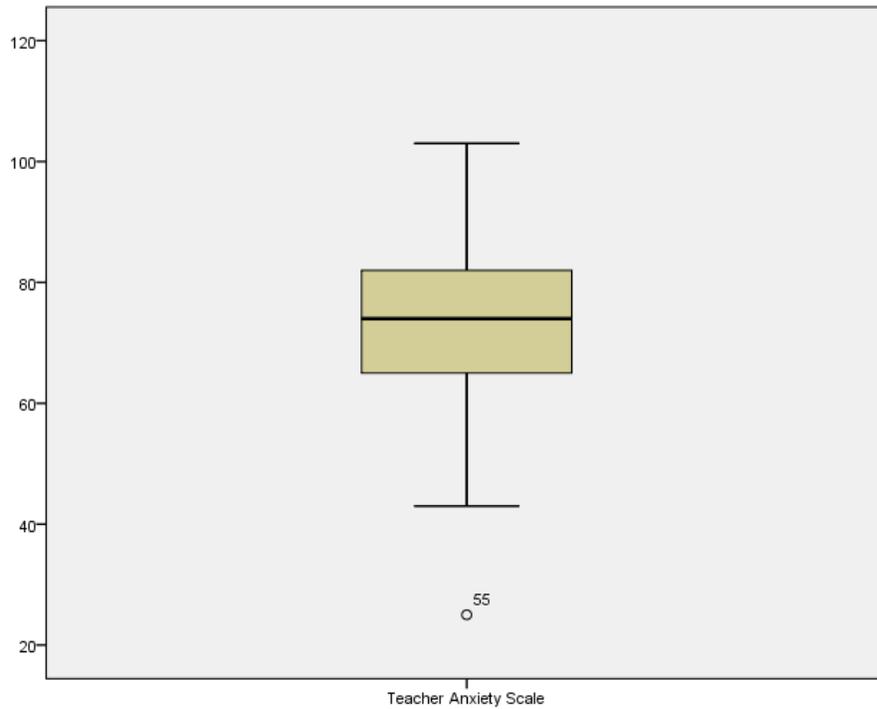


Figure 1. *Box-and-Whisker Plot of Teacher Anxiety Scores*

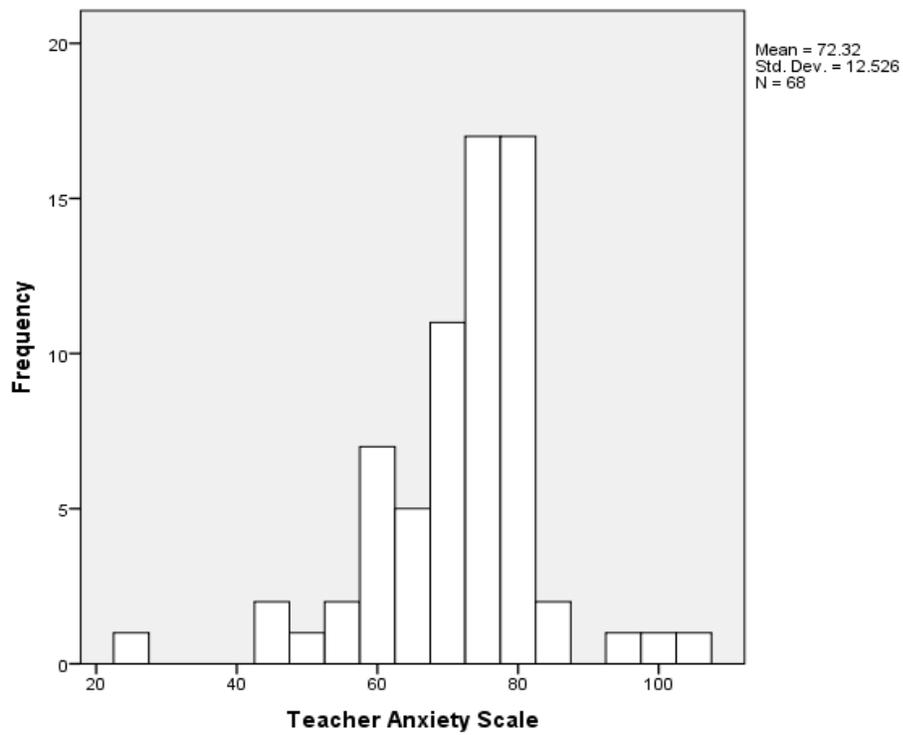


Figure 2. *Frequency Distribution of Teacher Anxiety Scale scores*

The Teacher Anxiety Scale consisted of 25 items. In order to assess the internal consistency (i.e. reliability) of the Teaching Anxiety Scale, Cronbach's alpha was computed, including all items. One outliers was removed from the reliability analysis (based on 3 standard deviations +/- the mean). The inter-item reliability was high ($\alpha = .904$, $n = 60$). The mean total for the Teacher Anxiety Scale was 73.08 ($SD = 11.61$). The range was fairly large, with the lowest total score of 43 and the highest score of 103.

Participants reported the number of literacy course hours they had taken toward obtaining an elementary education degree. On the survey given to participants, the number of course hours was coded as 1= 3 hours, 2= 6 hours, 3 = 9 hours, 4 = 12 hours, 5 = 15 hours, 6 = more than 15 hours. On average, participants reported the number of literacy course hours as 3.93 ($SD = 1.41$), with a range from one to six. This corresponds to approximately 11.7 course hours taken in literacy teacher-training courses. The data for the number of hours participants had taken in literacy was not normally distributed (Kolmogorov-Smirnov statistic = .185, $p < .001$) (See Table 4 for descriptive statistics and inter-item reliability).

Table 4.

Descriptive statistics and inter-item reliability for literacy and math course hours and teacher anxiety scale

	Mean (SD)	n	Median	Range	N (of items)	Cronbach's Alpha
Course Hours (in literacy)	3.90 (1.43)*	68	4.00	1 – 6	n/a	n/a
Course Hours (in mathematics)	2.97 (1.45)*	68	3.00	1 - 6	n/a	n/a
Teacher Anxiety scale	73.08 (11.61)	60	75.00	43 - 103	25	.904

*This variable was coded as 1 = 3 hours, 2 = 6, hours, 3 = 9 hours, 4 = 12 hours, 5 = 15 hours, and 6 > 15 hours. A mean of 3.90 is approximately 11.7 hours; A mean of 2.97 is approximately 8.9 hours.

The research hypothesis was that there is not a significant relationship between the number of pre-service course hours a teacher had taken in literacy and their level of teaching

anxiety, as measured via the teacher anxiety scale. The null hypothesis posits that there is no relationship between the number of course hours in literacy and teacher anxiety. Because neither the number of course hours taken in literacy nor the Teacher Anxiety Scale scores approximated a normal distribution, Spearman's correlation coefficient was calculated instead of Pearson's r correlation. Spearman's correlation is more appropriate for rank order data, as is the case in the present data-set. There was no significant relationship between the amount of pre-service course hours in literacy and teacher anxiety, $r_s = .020$, $p = .878$. Thus, the null hypothesis is retained.

Research Question 2: Is there a relationship between the number of college course hours a pre-service teacher has taken in mathematics and that teacher's teaching anxiety?

In order to test research question 2, a correlation was computed on the total Teaching Anxiety Scale scores and the number of college mathematics course hours participants had taken. Before conducting the analysis, the data were examined for outliers and to determine whether the data was approximately normally distributed. Because the Teaching Anxiety Scale is the same as was used in research question 1, the same outlier was removed from the reliability and all subsequent analyses for research question 2.

Participants reported the number of mathematics course hours they had taken toward obtaining an elementary education degree. On the survey given to participants, the number of course hours was coded as 1 = 3 hours, 2 = 6 hours, 3 = 9 hours, 4 = 12 hours, 5 = 15 hours, 6 = more than 15 hours. On average participants responses were 3.00 ($SD = 1.44$), with a range from one to six. This corresponds to slightly less than 9 course hours completed in mathematics training courses. The number of course hours participants had taken in mathematics did not approximate a normal distribution (Kolmogorov-Smirnov statistics = .233, $p < .001$) (See Table 2).

The research hypothesis was that there would be a significant relationship between the number of pre-service mathematics course hours a teacher and their level of teaching anxiety, as measured via the teacher anxiety scale. The null hypothesis posits that there is no relationship between the number of mathematics course hours and teacher anxiety. Because neither the Teaching Anxiety Scale nor the number of course hours in mathematics were normally distributed, Spearman's correlation coefficient was calculated instead of Pearson's r . No significant relationship between the amount of pre-service mathematics course hours and teacher anxiety was observed, $r_s = -.067$, $p = .610$. Thus, the null hypothesis is retained.

Research Question 3: Is there a relationship between the anxiety level the pre-service teacher feels in literacy and that teacher's teaching self-efficacy?

In order to test research question 3, a correlation was computed on the total Reading Teaching Efficacy Instrument (RTEI) scale scores and scores on the Teaching Anxiety Scale. The same scale measuring teaching anxiety that was used to analyze research questions 1 and 2 was utilized to analyze research question 3. Based on this, it is already known that the data for teaching anxiety is not normally distributed. However, for completeness, the RTEI scale was analyzed for outliers and normality.

An inspection of the data was performed on a box-and-whisker plot (Figure 3) and a frequency histogram (Figure 4). It appears that there was one outlier on the RTEI, with a low score of 26. Using the sample mean and standard deviation, a score of 33.03 on the RTEI would be three standard deviations below the mean. Therefore, it was determined that this outlier would be removed from the reliability and all subsequent analyses. Furthermore, from the frequency distribution, it was determined that the data appear to be approximately normally distributed. The Kolmogorov-Smirnov test for normality was also computed to assess normality.

The null hypothesis for the Kolmogorov-Smirnov test posits that the data are not significantly different from a normal distribution. The Kolmogorov-Smirnov test for the data from the current sample of teacher anxiety scale before removing the outlier was significant (Kolmogorov-Smirnov statistic = .109, $p = .043$). However, after removing the outlier, the data did indeed approximate a normal distribution (Kolmogorov-Smirnov statistic = .094, $p = .200$).

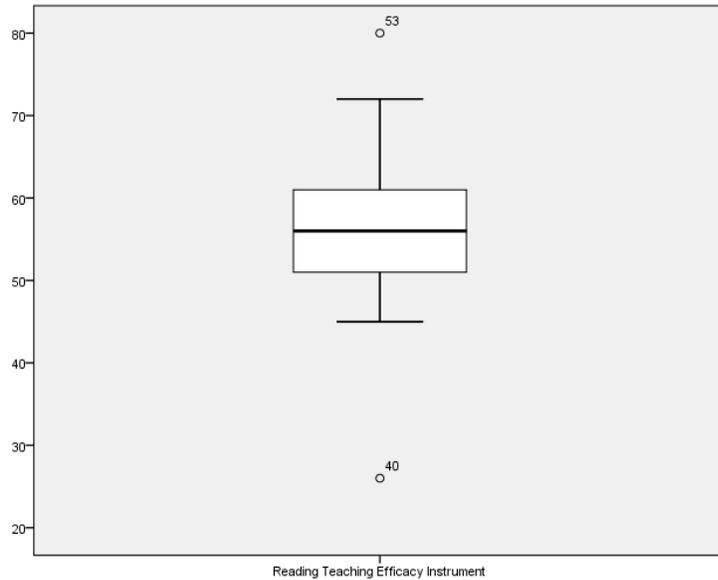


Figure 3. Box-and-Whisker plot of Reading Teaching Efficacy instrument

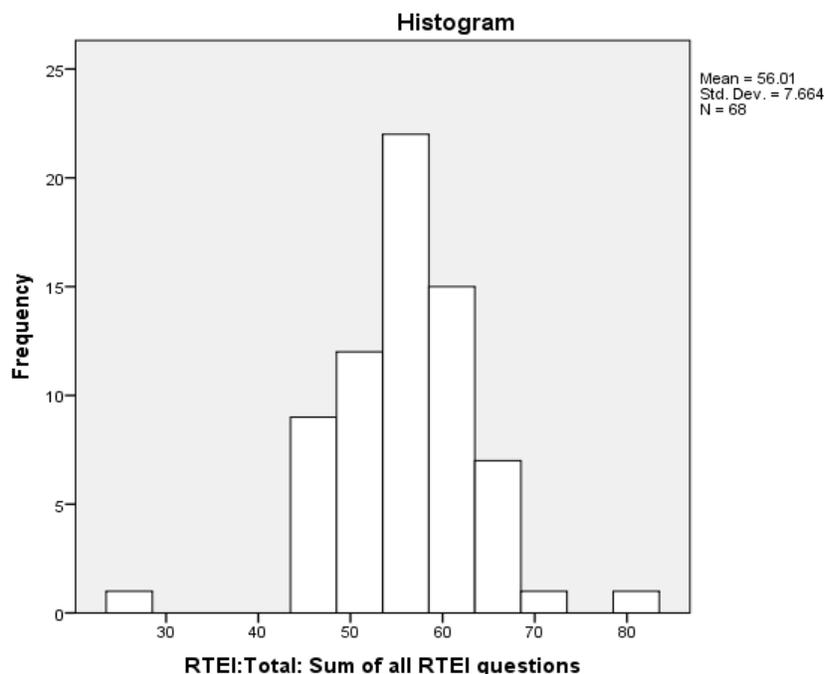


Figure 4. Frequency Histogram for the Reading Teaching Efficacy instrument

This instrument consisted of 16 items. The internal consistency of the scale was acceptable ($\alpha = .843$, $n = 65$). The average score on the Reading Teaching Self-Efficacy scale was 56.40 ($SD = 6.65$). According to the creators of the instrument (Szabo & Mokhtari, 2004), this falls within the “average” range (i.e. Yes, I sometimes know how to teach reading skills and strategies and I can determine to some extent what students need to become better readers). The lowest score on the RTSE scale was 26, while the highest score was 80 (See Table 5 for descriptive statistics on the RTSE and sub-scales)

Table 5.

Descriptive statistics and internal reliability of The Reading Teaching Efficacy instrument and subscales

	Mean (SD)	n	Median	Range	N (of items)	Cronbach's Alpha
Teaching Efficacy Instrument	56.40 (6.65)	65	56.00	45 – 80	16	.843
Reading	34.91	65	33.00	24 - 50	10	.856

teaching self- efficacy	(5.25)					
Reading	21.49	65	23.00	15 - 30	6	.779
Teaching outcomes	(2.90)					

The RTSE instrument also contains the reading teaching self-efficacy (RTSE) and reading teaching outcome expectancy (RTOE) sub-scales. The internal consistency of these sub-scales was also assessed. The RTSE sub-scale consisted of 10 items. For this sub-scale, the internal consistency was acceptable ($\alpha = .856$, $n = 65$). The mean score on the RTSE sub-scale was 34.84 ($SD = 5.27$). This falls within the “low” range of reading teaching self-efficacy (“Yes, I can teach reading effectively to some of my students, some of the time.” Szabo & Mokhtari, 2004). The lowest score on this sub-scale was 24, and the highest score was 50.

The RTOE sub-scale consisted of six items. The internal consistency was acceptable ($\alpha = .779$, $n = 65$). The mean score for the RTOE sub-scale was 21.49 ($SD = 32.90$). This falls within the “average” range of the reading teaching outcome expectancy sub-scale (i.e. “Yes, I have the ability to sometimes positively impact or counter-balance external forces in order to improve some of my student’s reading development.”). The lowest score on this sub-scale was 15 and the highest score was 30.

The research hypothesis was that there is a relationship between the anxiety level that pre-service teachers feel and teachers’ teaching self-efficacy in literacy. The null hypothesis posits that there is no relationship between teachers’ anxiety and teaching self-efficacy. Because the Teaching Anxiety Scale was not normally distributed, Spearman’s correlation coefficient was used instead of Pearson’s correlation coefficient to assess the relationship between teaching anxiety and reading teaching efficacy. There was no significant association between teaching anxiety and the reading teaching efficacy instrument scale, $r_s = -.052$, $p = .681$. However, the

correlations between the reading teaching self-efficacy sub-scale and the teacher anxiety scale was significant, $r_s = -.257$, $p = .040$ (Figure 5). The relationship was of a medium-sized effect, and negative, indicating that as teaching anxiety increased, teaching self-efficacy in reading decreased. There was also a significant association between the teaching anxiety scale and the reading teaching outcome expectancy sub-scale, indicating a increase in outcome expectancy as teaching anxiety increased, $r_s = .342$, $p = .006$ (Figure 6).

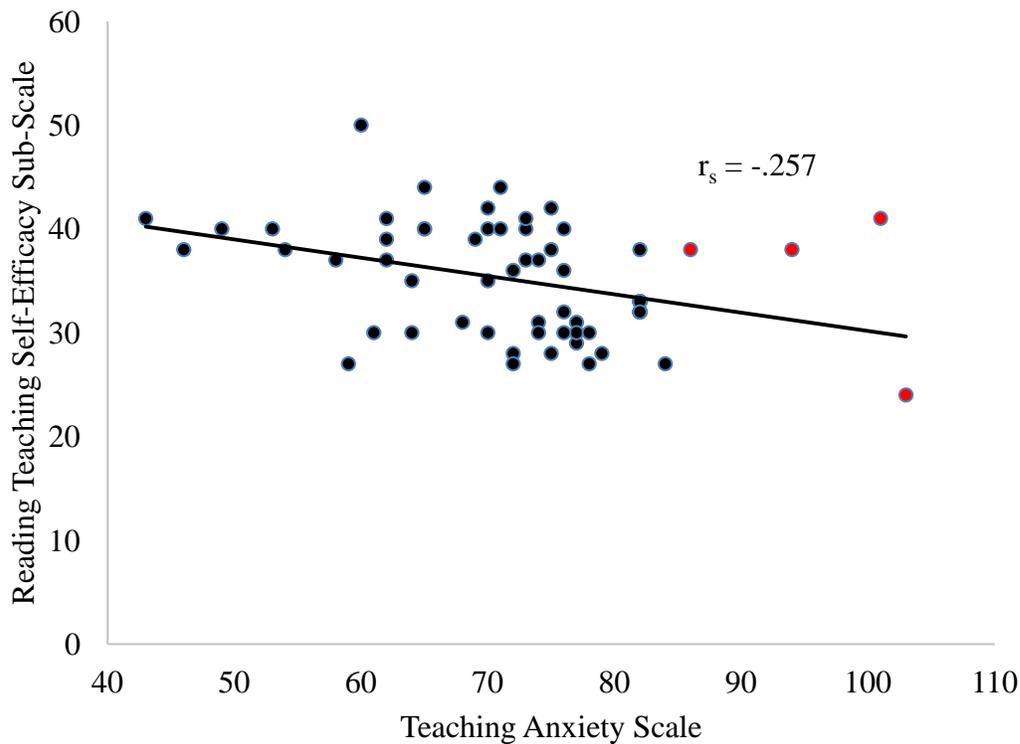


Figure 5. Scatterplot of the relationship between participants' scores on the teaching anxiety scale and the reading teaching self-efficacy sub-scale.

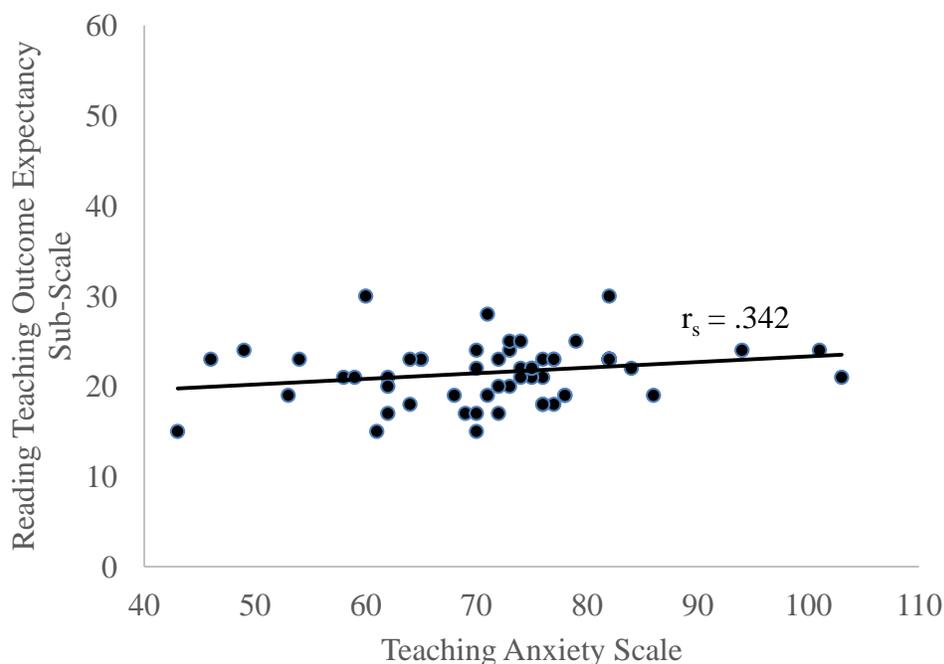


Figure 6. Scatterplot of the relationship between participants' scores on the teaching anxiety scale and the reading teaching outcome-expectancy sub-scale.

Research Question 4: Is there a relationship between the anxiety level the pre-service teacher feels in mathematics and that teacher's teaching self-efficacy?

In order to test research question 4, correlation analyses between teaching anxiety scale scores and mathematics teaching efficacy belief scores (MTEBI), as well as the sub-scales of mathematics teaching self-efficacy and outcome expectancy were carried out. The same scale measuring teaching anxiety in the previous research questions was utilized to analyze research question 4. Thus, the distribution of the sample data for teaching anxiety is not normally distributed.

A visual inspection of the data was performed with a box-and-whisker plot (Figure 7) and a frequency histogram (Figure 8). It appears that there was one outlier on the MTEBI, with a low score of 25. Using the sample mean and standard deviation, a score of 27 on the MTEBI would be three standard deviations below the mean. Therefore, it was determined that this

outlier would be removed from the reliability and all subsequent analyses. Furthermore, the MTEBI scores do not approximate a normal distribution (Kolmogorov-Smirnov Statistic = .133, $p = .010$). Therefore, Spearman's correlation coefficient will be used to analyze research question 4.

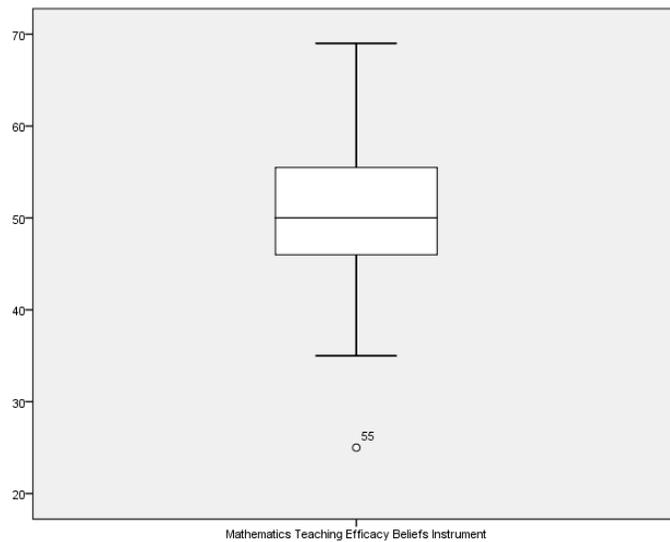


Figure 7. Box-and-Whisker plot of Mathematics Teaching Efficacy instrument

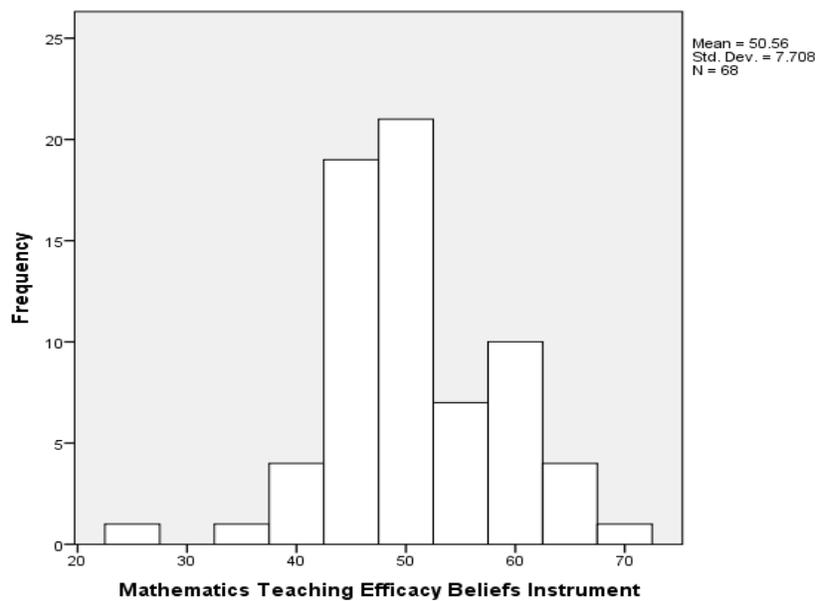


Figure 8. Frequency Histogram for the Mathematics Teaching Efficacy instrument

The MTEBI consisted of 21 items¹. The internal consistency of the scale was acceptable ($\alpha = .785$, $n = 61$). The mean score for the Mathematics teaching efficacy beliefs scale was 50.66 ($SD = 6.68$). The lowest score was 25, while the highest score was 69 (See Table 6).

Table 6.

Descriptive statistics and internal reliability of The Mathematics Teaching Efficacy instrument and subscales

	Mean (SD)	Median	Range	N (of items)	Cronbach's Alpha
Mathematics teaching efficacy belief	50.66 (7.71)	50.00	25 - 69	21	.785
Personal Mathematics teaching efficacy	31.31 (6.65)	33.00	13 - 48	13	.888
Mathematics teaching outcome expectancy	19.34 (3.22)	18.00	11 - 26	8	.775

The internal consistency of both the Personal Mathematics Teaching Efficacy (PMTE) and the Mathematics Teaching Outcome Expectancy (MTOE) sub-scales were also assessed. The PMTE sub-scale consisted of 13 items. The internal consistency measure, Cronbach's alpha, for the PMTE sub-scale was high ($\alpha = .888$, $n = 61$). The mean score for the PMTE sub-scale was 31.31 ($SD = 6.65$). The low score on the PMTE scale was 13, while the highest score was 48.

The MTOE sub-scale consisted of eight items. The internal consistency for the MTOE was acceptable ($\alpha = .775$, $n = 61$). The mean score for the MTOE sub-scale was 19.34 ($SD = 3.22$). The lowest score was 11, while the highest score was 26.

The research hypothesis associated with research question 4 was that there is a significant association between teaching anxiety and mathematics teaching self-efficacy. The null hypothesis posits that there is no relationship between teaching anxiety and mathematics

¹ Two items were excluded from the scale, similarly to the original article to implement this scale (Enochs, Smith, & Huinker, 2000)

teaching self-efficacy. To address this question, three correlations were computed to determine: (1) the relationship between the overall scores on the MTEBI and the teaching anxiety scale score, (2) the relationship between scores on the PMTE sub-scale and the teaching anxiety scale, and (3) the relationship between scores on the MTOE sub-scale and the teaching anxiety scale scores. There was no significant association between teaching anxiety scores and the overall scores on the MTEBI, $r_s = .226, p = .079$. However, there was a significant positive relationship between teaching anxiety and mathematics teaching efficacy such that as teaching anxiety increase, so did scores on the personal mathematics teaching efficacy sub-scale, $r_s = .322, p = .011$ (Figure 9). There was also a significant negative relationship between teaching outcome expectancy and teaching anxiety scores, $r_s = -.359, p < .004$ (Figure 10).

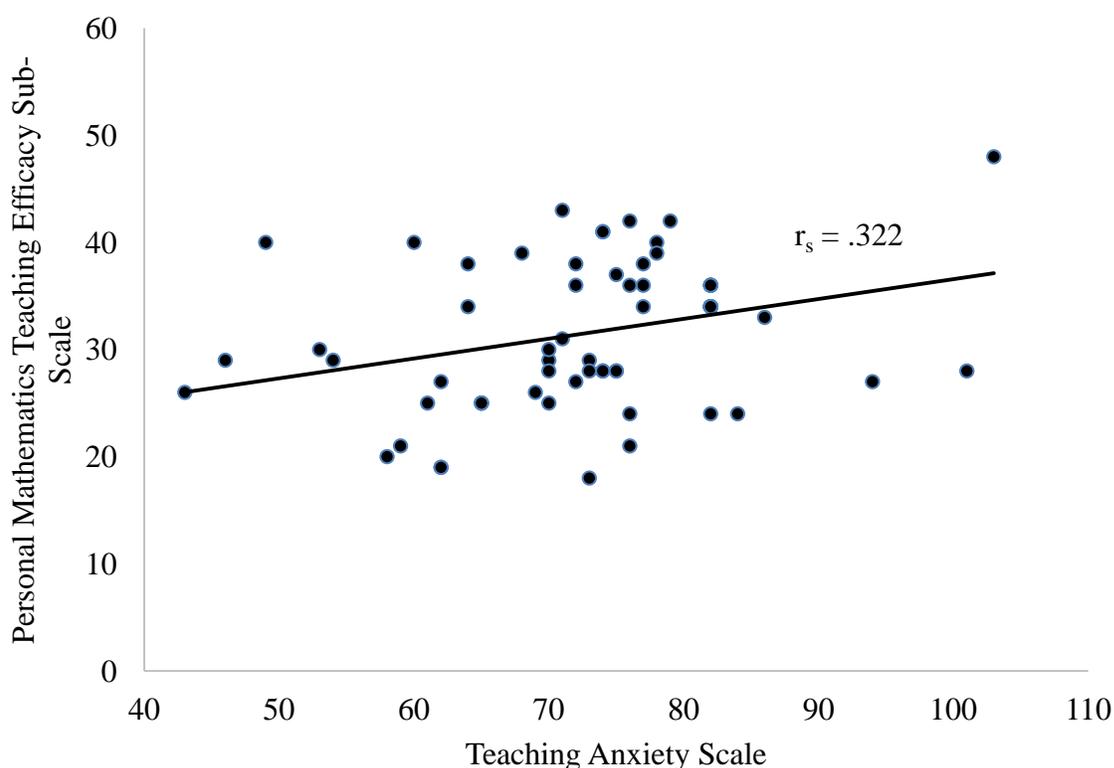


Figure 9. Scatterplot of the relationship between participants' scores on the teaching anxiety scale and the mathematics teaching self-efficacy sub-scale.

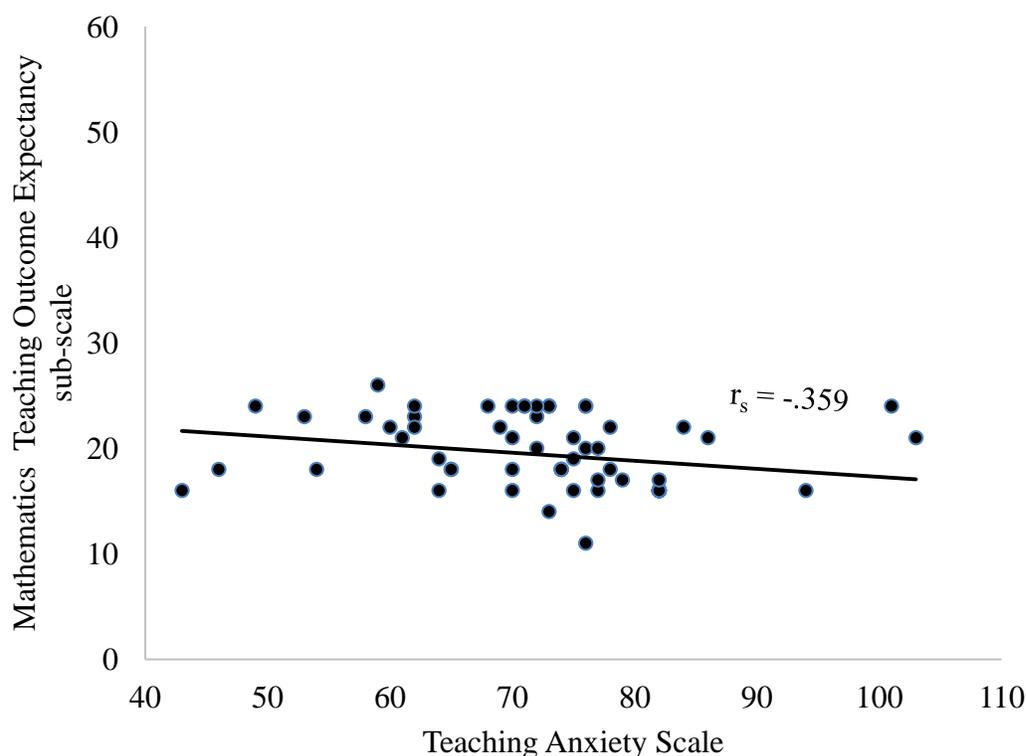


Figure 10. Scatterplot of the relationship between participants' scores on the teaching anxiety scale and the mathematics teaching outcome-expectancy sub-scale.

Summary

Spearman Correlation coefficients were calculated in order to address research questions 1-4. In the present sample, there was no statistically significant relationship between the number of course hours pre-service teachers completed in either literacy or mathematics and their level of teaching anxiety (Research Questions 1 and 2). There were, however, statistically significant relationships between the level of teaching anxiety and teachers' feelings of self-efficacy in teaching both literacy and mathematics (Research Questions 3 and 4) (Tables 5 & 6). In terms of literacy self-efficacy ratings, teachers' ratings in reading self-efficacy decreased as their teaching anxiety scores increased, as demonstrated by the relationship between teaching anxiety scale scores and the reading teaching self-efficacy subscale (Figure 5). However, teachers' ratings in

mathematics self-efficacy were positively related to their teaching anxiety scores (Figure 9). Meaning that as anxiety increased, self-efficacy also increased. However, the size of the effect was small-to-moderate (Cohen, 1988). In terms of the relationship between teaching anxiety and outcome expectancies in reading and math, there was a positive relationship between anxiety and outcome expectancies in reading (Figure 6), and a negative relationship between anxiety and outcome expectancies in mathematics (Figure 10). In literacy, as teaching anxiety increased, outcome expectancies increased, although the magnitude of the effect was small (Cohen, 1988). In mathematics, as teaching anxiety increased, outcome expectancies decreased, and the magnitude of the effect was moderate-to-large (Cohen, 1988).

CHAPTER FIVE: CONCLUSION

Overview

Chapter five offers a discussion of the purpose and findings according to the research questions and null hypothesis. Implications for the study are included, as well as limitations. Recommendations for further research in the field of pre-service training and how it affects anxiety and self-efficacy are also discussed.

Discussion

The primary goal of the present research was to examine the correlation between pre-service course hours in literacy and mathematics, and teachers' anxiety and self-efficacy in teaching reading and mathematics. Based on this central goal, four research questions were generated for investigation: (1) is there a correlation between college course hours in literacy and teachers' anxiety? (2) is there a correlation between college course hours in mathematics and teachers' anxiety? (3) Is there a correlation between teachers' anxiety and self-efficacy in teaching literacy? And, (4) is there a correlation between teachers' anxiety and self-efficacy in teaching mathematics? The present study yielded no evidence of a correlation between the number of pre-service college course hours in literacy or mathematics and teachers' anxiety. However, there was evidence of a correlation between anxiety and teaching self-efficacy in both literacy and mathematics.

H₀1 – There will be no statistically significant correlation between the number of college hours a pre-service teacher has taken in *literacy* and the level of teaching anxiety, as measured by the Teaching Anxiety Scale.

H₀2 – There will be no statistically significant correlation between the number of college hours a pre-service teacher has taken in *mathematics* and the level of teaching anxiety, as measured by the Teaching Anxiety Scale.

The lack of a correlation between the number of college course hours taken, in both literacy and mathematics, and teachers' anxiety is consistent with past research, which as demonstrated that teachers' anxiety lowers as a result of receiving feedback and observing others teaching, as well as with experience teaching (Gresham, 2009; Parsons, 1973). Presumably, on average, participants in the present study received sufficient training in their course work (about 11.7 hours of coursework in literacy and 9 hours of coursework in mathematics) to adequately reduce their anxiety prior to their pre-service teaching experiences.

If there were an association between college course hours completed and teaching anxiety, it would have been more likely to be observed in mathematics. Mathematics anxiety may occur when pre-service teachers are asked to perform mathematical operations (Gresham, 2007), subsequently affecting the ability of pre-service teachers (Malinsky, et al., 2006). However, this effect was not observed in the present study. Previous research has demonstrated that mathematics methods courses actually lower anxiety in teaching mathematics (Gresham, 2004; Sloan, 2010). The high number of college course hours specifically in mathematics training was seemingly sufficient in reducing mathematical anxiety.

The scale used to measure anxiety, the Teaching Anxiety Scale, was designed to specifically measure anxiety related to the task of teaching (Parsons, 1973), and with higher scores indicative of a higher degree of self-reported, teaching related anxiety. In the original study summarizing the Teaching Anxiety Scale, the average score for pre-service teachers with high anxiety was 77.1. In the present study, the average score on the Teaching Anxiety Scale

was lower (73.03), indicating that the teachers in the present sample were, generally, not high in anxiety. Furthermore, the internal consistency measure was high, indicating that there was limited bias in scores based on any one particular item.

Taken together, the results for research questions one and two are consistent with previous literature. Furthermore, the hypothesis that more college course hours in the topics that pre-service teachers will be teaching reduces teaching related anxiety, may be cautiously supported. However, to directly observe the impact of college course work on teaching anxiety, a future study needs to compare anxiety levels in pre-service teachers with more and less (or no) course hours in the subjects they will be teaching. In the present study, the majority of pre-service teachers had at least 9 course hours in teaching literacy (80.8%), and at least 9 course hours in teaching mathematics (57.4%). With such a large proportion of the sample completing a relatively large amount of coursework in the subject material, it is difficult to determine whether anxiety may be greater in teachers with less sufficient training or preparation.

H₀₃ – There will be no statistically significant correlation between the level of teaching anxiety as measured by the Teaching Anxiety Scale and literacy self-efficacy of the pre-service teacher as measured by the Reading Teaching Efficacy Instrument (RTEI).

The present study did find a significant correlation between teachers' anxiety and self-efficacy in teaching literacy courses. Specifically, there was a negative correlation between teachers' anxiety and the reading teaching self-efficacy sub-scale, such that as anxiety increased, reading teaching self-efficacy decreased. Additionally, there was a small, but statistically significant, positive correlation between anxiety and reading teaching outcome expectancy, such that as anxiety increased, teaching outcome expectancy slightly increased.

Teachers' self-efficacy refers to the belief in one's own ability to engage all students in the learning process (Bandura, 1977). Previous research on self-efficacy has demonstrated that people learn through observation, and that self-efficacy is specific to particular contexts (Bandura, 1977, 1986). Specifically for teachers, high content knowledge has been observed to reduce anxiety, and increase self-efficacy (Tchoshanov, 2011). Content knowledge can be increased via teachers' preparation (Goldstein & Noguera, 2006).

Presumably, if teachers' preparation (i.e. college course hours) adequately reduced anxiety, teachers with higher content knowledge of literacy should demonstrate higher efficacy and lower anxiety in teaching literacy. This hypothesis was confirmed in the present study by the negative correlation between teachers' anxiety and the reading teaching self-efficacy subscale. As stated previously, as teachers anxiety increased, reading teaching self-efficacy decreased. Or, perhaps a better way to visualize this correlation is, as teachers anxiety decreased, reading teaching self-efficacy increased. Lower levels of anxiety were associated with higher levels of reading teaching self-efficacy. As anxiety goes up, teachers were less confident in their ability to teach reading effectively. This is consistent with previous research in which teachers' anxiety has been found to be closely related to the expectation of the teacher to be able to effectively deliver the material (Bursal & Paznokas, 2006).

Outcome expectancy refers to teachers' belief in the likelihood of the desired outcome (e.g. Bandura, 1986). In the present study, outcome expectancy refers to teachers' belief that they can positively affect students' reading development in all, most, some, or none of their students. To examine the impact of anxiety on outcome expectancy, it is important to consider the size of the relationship. The correlation between anxiety and reading teaching outcome expectancy was a small effect size (Cohen, 1988), indicating that as anxiety increased slightly,

teachers' outcome expectancy increased slightly. Research in cognitive psychology has demonstrated that small amounts of anxiety are actually good for performance (Owens, Stevenson, Hadwin, Norgate, 2012). Perhaps as teachers' anxiety increases slightly, their belief in positive reading teaching outcomes also increase.

These findings demonstrate the importance of reducing anxiety for reading teaching self-efficacy, but not so much that teachers are overly confident. Specifically, in elementary school teachers, who are not content-specific teachers, increasing content-specific college coursework may reduce anxiety and increase teaching self-efficacy, particularly for teaching reading. However, the result of the present study must be interpreted cautiously, as the present study reports correlational relationships between anxiety and self-efficacy, not a causal relationship.

H₀₄ – There will be no statistically significant correlation between the level of teaching anxiety as measured by the Teaching Anxiety Scale and mathematics self-efficacy of the pre-service teacher as measured by the Mathematics Teaching Efficacy Beliefs Instrument (MTEBI).

Previous research has suggested that elementary teachers do not have content-specific knowledge necessary to successfully teach mathematics (Post et al., 1991), and that early student achievement in math may increase as teachers' content knowledge increases (Hill et al., 2005). Specifically for pre-service teachers, those who had high math content knowledge were better able to make connections between pre-service experiences (i.e. college courses) and future teaching experience (Newton et al., 2012).

Similarly to the correlation between anxiety and teaching self-efficacy in reading, the correlation between anxiety and teaching self-efficacy in math yielded significant relationships between anxiety and each sub-component of mathematics teaching self-efficacy. There was a

significant positive correlation between anxiety and mathematics teaching efficacy. As anxiety increased, so did scores on the personal mathematics teaching efficacy sub-scale. Furthermore, there was a negative correlation between anxiety and teaching outcome expectancy.

The positive correlation between anxiety and teaching self-efficacy in mathematics is consistent with the idea that a small amount of anxiety may actually improve performance. Mathematics anxiety has been well-studied (Gresham, 2004, 2006; Bursal & Paznokas, 2006; Malinsky et al., 2006; Sloan & Giesen, 2003), as a negative influence on teaching performance. However, the anxiety measure used in the present study did not directly measure mathematics anxiety, rather, general teaching anxiety. As such, the small relationship between general teaching anxiety and self-efficacy may be explained similarly to the explanation of research question 3. That is, teachers' self-efficacy in mathematics teaching may actually increase slightly as their anxiety increases slightly.

In regards to the negative correlation observed between teaching anxiety and mathematics teaching outcome expectancy, teachers with higher anxiety in general may avoid or spend less time preparing for instruction in subjects that cause that anxiety (i.e. mathematics) (Isiksal et al., 2009; Steel et al., 2013). Whereas a small correlation was observed between anxiety and mathematics self-efficacy, the relationship between anxiety and outcome expectancy in teaching mathematics was large. If teachers' anxiety causes them to avoid preparation in difficult subject areas, then it follows that their outcome expectancy in that subject should decrease. Meaning, that their belief in successfully teaching mathematical concepts decrease.

Implications

Research on the effectiveness of teachers entering the workforce has demonstrated that teachers are not performing at a high level upon entry, regardless of the strong academic

background. The present study contradicts this research in that the pre-service teachers in the current sample had average belief in their effectiveness in teaching reading and math, and lower levels of anxiety. Pre-service training consists of training prior to employment and, generally, includes a college degree of some kind. This pre-service training is one place where teachers gain content knowledge of the subjects that will eventually be taught in the classroom. This training is a prerequisite to educational employment. Many feel that universities are doing a good job of training new teachers; some research demonstrates that these institutions are doing an inadequate job preparing novice teachers for the experiences that will be faced within the classroom (Alper, 2014). However, the present study does not directly test the claim that teachers are objectively effective upon entry into the workforce. To do this, some measure of student achievement (e.g. semester grades/longitudinal study design) would need to be achieved.

What is known is that student achievement can be directly linked to a teacher's preparation, the content knowledge, and the delivery of instruction (Goldstein & Noguera, 2006). Considering that in the present study, pre-service teachers generally had at least 9 hours of content specific course instruction in both literacy and math, and teachers had relatively low levels of anxiety, they themselves must feel somewhat prepared to teach both literacy and mathematics. This supports previous findings that demonstrate a mixture of courses that focus on instruction, assessment, development, and reflection on current practices and experiences will likely increase the level of self-efficacy held by the pre-service teacher (Daniels, et al., 2011).

Furthermore, past research has suggested that the impact of teacher training and education on student achievement is greater for elementary reading instruction compared to math instruction (Rahman et al., 2011). In the present study, pre-service teachers had approximately 9-11.7 course hours in content knowledge of both literacy and mathematics. Again, the present

study does not directly measure the effectiveness of teachers, but rather teachers' own belief in their efficacy. Teachers had average ratings (compared to the norms established by the original instruments; Szabo & Mokhtari, 2004; Enochs et al., 2000). Research has shown that with pre-service teachers, teacher education courses impact teachers' disposition towards teaching all students (Mueller & Hindin, 2011). In the present study, teachers were sufficiently confident in their ability (measured by self-efficacy and outcome expectancy) in teaching mathematics and literacy. This is consistent with past studies demonstrating that knowledge of subject matter allows a teacher to teach more effectively, which leads to improved student learning (Richardson, 2008). However, it would be interesting to see the correlation between teachers' own self-belief and student achievement to determine whether their perception of their own efficacy produces higher student achievement.

In regards to the correlation between anxiety and teaching self-efficacy, the present study supports the notion that adequate preparation and training reduces anxiety, while increasing self-efficacy in teaching. Teachers had higher self-efficacy in teaching literacy as anxiety was reduced. Conversely, teachers had higher outcome expectancies in teaching mathematics as anxiety was reduced. These findings demonstrate that the correlation between anxiety and teaching self-efficacy functions slightly differently depending on whether teaching mathematics and literacy. However, where these studies converge is on the importance of reducing teacher anxiety in order to improve teacher effectiveness. As such, anxiety may be reduced through efficient and effective teacher training. One study suggests that universities may consider expanding support of beginning teachers throughout the first few years of classroom instruction (Hudson, 2012).

Conclusions and Recommendations

One provision in NCLB was that all teachers in public education be highly qualified in the area in which they teach. While RTTT and ESEA don't specifically address the idea of highly qualified, both policies note the importance of the teacher's role in education and the importance of having effective teachers in the classroom. Elementary school teachers must demonstrate a working knowledge of all subject areas including reading, writing, mathematics, and other basic areas of elementary curriculum. One way to do this is to establish a standard number of course hours that all elementary school teachers should spend on content specific courses. In the present study, the majority of pre-service teachers had at least 9 course hours in both literacy and mathematics. Additionally, the pre-service teachers in the sample were in the average range of self-efficacy in teaching mathematics and literacy, as well as in their levels of anxiety. As such, it was difficult to determine the impact of teacher training and preparation on anxiety. It would be interesting to see whether anxiety would increase as a function of a decrease in content-specific course requirements (e.g. less than 9 course hours), and if so, would the correlation between anxiety and self-efficacy change? The present study provides preliminary evidence on the validity of education program curriculum, specifically that increased number of course hours for elementary education majors should provide support for future teaching practices, and confidence. It appears that having at least 9 course hours in content-specific courses serves to reduce anxiety and increase self-efficacy. However, the present study is based on a correlational research design. Future work should implement an experimental design in order to test the causality of this claim.

Limitations

There are several limitations in the current study that must be mentioned, and as such the results must be interpreted cautiously. First, the participants in the present study all come from

teacher-training programs in local state or private universities in Mississippi and Alabama.

Therefore, it is likely that their teacher-training programs did not vary greatly (as demonstrated by the similar number of course hours in each subject). In order to truly test the impact of college coursework on teacher efficacy, a wider range of variability should be examined. For example, comparing teachers who have had many or few content-specific course hours could provide further insight into the correlation between course hours and teaching self-efficacy.

A second limitation of the present study is the lack of individual difference measures among the participants. While demographic information, such as age, gender, and ethnicity, were accounted for, participants did not provide any information in terms of motivation, teaching style preference, personality type, or other psychological or individual characteristics.

Finally, the current study utilized a correlational research design. While correlational studies are useful in establishing relationships between two variables, they can make no causal claims about the nature of that relationship. However, as a preliminary step in investigating the nature of the impact on teacher-training programs and teaching anxiety and self-efficacy, the present study may serve as a foundation for future experimental research.

Recommendations for Future Research

As previously mentioned, the present study had several limitations, such as the sampling selection and research design, that may limit the generalizability of the results. For example, a future study may focus on replicating the findings from the present study in a different sample. A replication study would serve two purposes: (1) extend findings to a different sample, and (2) determine whether teacher-training programs differ in terms of the number of course hours that pre-service teachers are required to take. If a future study in a different sample finds a correlation between anxiety and the number of content-specific course hours teachers are

required to complete, it would provide converging evidence that adequate preparation is necessary to reduce anxiety. Furthermore, a comparative analysis across two different teacher-training programs would provide insight into the effectiveness of each teacher-training program.

In order to directly test the effectiveness of teachers, a future study could implement a longitudinal design examining measures of student achievement. For example, a study could compare pre- and post-test scores on a content-specific exam in order to measure teacher effectiveness. Furthermore, it could analyze the data as a function of course-specific hours pre-service teachers had to complete before beginning teaching. Similarly, a study could compare student achievement in classrooms of pre-service teachers and recent graduates. These studies could still report teachers' self-efficacy and anxiety levels to determine whether their own self-beliefs in teaching content-specific areas matched student outcomes.

REFERENCES

- Adams, M. A. (2008). *Improving student performance by enhancing teacher training*. (Order No. 3325511, Northcentral University). Retrieved from <http://search.proquest.com/docview/304833188?accountid=12085>. (304833188).
- Akhter, N., Kanwal, N., Fatima, Q., & Mahmood, M. D. (2015). Relationship between self-efficacy and anxiety in student-teachers with reference to their teaching practices at school placement. *Journal of Educational Research, 19*(1), 73-85.
- Al-Mehrzi, R., Al-Busaidi, S., Osman, M., Amat, M., & Al-Ghafri, S. (2011). Path analysis of the effects of teaching attitudes and anxiety o pre-service teachers "efficacy beliefs." *World Applied Sciences Journal 14 (Learning Innovation and Intervention for Diverse Learners)*, 52-59.
- Alper, S. L. (2014). First steps to education reform. *The Education Digest, 79*(5), 47-48.
- Bailey E. (2012). *Mississippi State University*. Retrieved from <http://mississippi.stateuniversity.com/>
- Bandura, A. (1977). Self-efficacy: Toward a unifying theory of behavioral change. *Psychological Review, 8*(4),191-215.
- Bandura, A. (1986). *Social foundations o f thought and action: A social cognitive theory*. Englewood Cliffs, NJ: Prentice-Hall. Bandura, A. (1994). Self-efficacy. In V. S. Ramachaudran (Ed.), *Encyclopedia of human behavior, 4*, 71-81. New York: Academic Press
- Bandura, A. (1997). Self-efficacy: Toward a unifying theory of behavioral change. *Psychological Review, 84*(2), 191-215.
- Bandura , A. (2001). Social cognitive theory: An agentic perspective. *Annual Review of Psychology, 52*, 1-26.

- Bandura, A. (2002). Social cognitive theory in cultural context. *Applied Psychology: An International Review*, 51(2), 269-290.
- Bandura, A. (2007). Much ado over a faulty conception of perceived self-efficacy grounded in faulty experimentation. *Journal of Social and Clinical Psychology*, 26(6), 641-658.
- Bilali, O. (2014). The teacher anxiety scale: The study of validity and reliability. *Journal of Educational and Social Research*, 4(2), 38-43.
- Bomer, R., & Maloch, B. (2011). Relating policy to research and practice: The common core standards. *Language Arts*, 89(1), 38-43. Retrieved from <http://search.proquest.com/docview/884628787?accountid=12085>
- Bond, N. (2011). Preparing preservice teachers to become teacher leaders. *The Educational Forum*, 75, 280-297.
- Boyd, D., Grossman, P., Lankford, H., Loeb, S., & Wyckoff, J. (2009). Teacher preparation and student achievement. *Educational Evaluation and Policy Analysis*, 31(4), 416-440.
- Buddin, R., & Zamarro, G. (2009). Teacher qualifications and student achievement in urban elementary schools. *Journal of Urban Economics*, 66(2), 103-115.
- Bursal, M. & Paznokas, L. (2006). Mathematics anxiety and preservice elementary teachers' confidence to teach mathematics and science. *School Science and Mathematics*, 106(4), 631-643.
- Chaliès, S., Bruno-Méard, F., Méard, J. & Bertone, S. (2010). Training preservice teachers rapidly: The need to articulate the training given by university supervisors and cooperating teachers. *Teaching and Teacher Education*, 26, 767-774.

- Cheung, H. Y., & Hui, S. K. F. (2011). Teaching anxiety amongst Hong Kong and Shanghai in-service teachers: The impact of trait anxiety and self-esteem. *Asia-Pacific Education Researcher*, 20(2), 395-409.
- Chung, H., & Kim, H. (2010). Implementing professional standards in teacher preparation programs in the united states: Preservice teachers' understanding of teaching standards. *KEDI Journal of Educational Policy*, 7(2) Retrieved from <http://search.proquest.com/docview/1013976928?accountid=12085>
- Cohen, J. (1988). *Statistical power analysis for the behavioral sciences 2nd ed.* Hilldale: Erlbaum Associates.
- Colson, T., Sparks, K., Cerridge, G., Frimming, R., & Willis, C. (2017). Pre-service teachers and self-efficacy: A study in contrast. *Discourse & Communication for Sustainable Education*, 8(2), 66-76.
- Cook, B. (2002). Inclusive attitudes, strengths and weaknesses of pre-service educators enrolled in a curriculum infusion teacher preparation program. *Teacher Education and Special Education*, 25, 262-277.
- Cowan, T. J. (2006). *A conceptual analysis of Albert Bandura's account of self-efficacy and its educational implications* (Order No. NR30353). Available from ProQuest Dissertations & Theses Global. (304940850). Retrieved from <http://search.proquest.com/docview/304940850?accountid=12085>
- Daniels, L. M., Mandzuk, D., Perry, R. P., & Moore, C. (2011). The effect of teacher candidates' perceptions of their initial teacher education program on teaching anxiety, efficacy, and commitment. *Alberta Journal of Educational Research*, 57(1), 88-106.

- Educational Testing Service (2013). *The praxis series: State requirements*. Retrieved from <http://www.ets.org/praxis/states>
- Enochs, L. G., Smith, P. L., & Huinker, D. (2000). Establishing factorial validity of the mathematics teaching efficacy beliefs instrument. *School Science and Mathematics, 100*, 194-202.
- Everhart, B. (2009). Anxiety of preservice teachers teaching students with disabilities: A preliminary investigation. *Education, 129*(4), 704-713
- Fetler, M. (2001). Student mathematics achievement test scores, dropout rates, and teacher characteristics. *Teacher Education Quarterly, 28*(1), 151-168.
- Flores, I. M. (2015). Developing preservice teachers' self-efficacy through field-based science teaching practice with elementary students. *Research in Higher Education Journal, 27*, 1-19. Retrieved from <http://search.proquest.com/docview/1658871954?accountid=12085>
- Forbes (2015). *University of Southern Mississippi*. Retrieved from <http://www.forbes.com/colleges/university-of-southern-mississippi/>
- Foster, J. M., Toma, E. F., & Troske, S. P. (2013). Does teacher professional development improve math and science outcomes and is it cost effective? *Journal of Education Finance 38*(3), 255-275. University of Illinois Press.
- Gall, M. D., Gall, J. P., & Borg, w. R. (2007). *Educational research*. Boston: Pearson.
- Glazerman, S., Mayer, D., & Decker, P. (2006). Alternative routes to teaching: The impacts of teach for America on student achievement and other outcomes. *Journal of Policy Analysis and Management, 25*(1), 75-96.

- Goldhaber, D., & Liddle, S. (2011). *The gateway to the profession: Assessing teacher preparation programs based on student achievement (CEDR working paper no. 2011-2.0.)*. Center for Education Data & Research: Washington, DC.
- Goldstein, J., & Noguera, P. A. (2006). A thoughtful approach to teacher evaluation. *Educational Leadership, 63*(6), 31-36.
- Gresham, G. (2004). Mathematics anxiety in elementary students. *CMC ComMuniCator, 29*(2), 28-29.
- Gresham, G. (2007). A study of mathematics anxiety in pre-service teachers. *Early Childhood Education Journal, 35*(2), 181-188.
- Gresham, G. (2009). An examination of mathematics teacher efficacy and mathematics anxiety in elementary pre-service teachers. *Journal of Classroom Interaction, 44*(2), 22-38.
- Gunning, A. M., & Mensah, F. M. (2011). Preservice elementary teachers' development of self-efficacy and confidence to teach science: A case study. *Journal of Science Teacher Education, 22*(2), 171-185. doi:<http://dx.doi.org/10.1007/s10972-010-9198-8>
- Harris, D. N., & Sass, T. R. (2009). The effects of NBPTS-certified teachers on student achievement. *Journal of Policy Analysis & Management, 28*(1), 55-80.
- Harris, D. N., & Sass, T. R. (2011). Teacher training, teacher quality and student achievement. *Journal of Public Economics, 95*(7-8), 798-812.
- Hart, N. (1987). Student teachers' anxieties, four measured factors, and their relationships to pupil disruption in class. *Educational Research, 29*(1), 12-18.
- Haverback, H. R., & Parault, S. J. (2011). High efficacy and the preservice reading teacher: A comparative study, *Teaching and Teacher Education, 27*(4), 703-711.

- Henry, G. T., Thompson, C. L., Bastian, K. C., Kershaw, D. C., Purtell, K. M., & Zulli, R. A. (2011) *Does teacher preparation affect student achievement?* (Working Paper, Version dated February 7, 2011) Chapel Hill, NC: Carolina Institute for Public Policy.
- Hill, H.C., Rowan, B., & Ball, D. L. (2005). Effects of teachers' mathematical knowledge for teaching on student achievement. *American Educational Research Journal*, 42(2), 371-406. Retrieved from <http://www.jstor.org/stable/3699380>
- Hudson, P. (2012). How can universities support beginning teachers? *Journal of Higher Education Theory and Practice*, 12(3), 50-59. Retrieved from <http://search.proquest.com/docview/1024140259?accountid=12085>
- Ingersoll, R. (1999). The problem of underqualified teachers in American secondary schools. *Educational Researcher*, 28(2), 26-37.
- Isiksal, M., Curran, J. M., Koc, Y., & Askun, C. S. (2009). Mathematics anxiety and mathematical self-concept: Considerations in preparing elementary teachers. *Social Behavior and Personality*, 37(5), 631-643. Retrieved from <http://search.proquest.com/docview/209934777?accountid=12085>
- Jacob, B. A., & Lefgren, L. (2004). The impact of teacher training on student achievement: Quasi-experimental evidence from school reform efforts in Chicago. *Journal of Human Resources*, (39)1, 50-79.
- Jamil, F. M., Downer, J. T., & Pianta, R. C. (2012). Association of pre-service teachers' performance, personality, and beliefs with teacher self-efficacy at program completion. *Teacher Education Quarterly*, 39(4), 119-138. Retrieved from <http://search.proquest.com/docview/1350426599?accountid=12085>

- Jansen, D. J. (2008). Validation of an instrument for mathematics enhancement teaching efficacy of pacific northwest agricultural educators. (Order No. 3295626, Oregon State University).
- Kane, T. J., Rockoff, J. E., & Staiger, D. O. (2008). What does certification tell us about teacher effectiveness? Evidence from New York City. *Economics Of Education Review*, 27(6), 615-631.
- Klassen, R.M., Bong, M., Usher, E.L., Chong, W.H., Huan, V.S., Wong, I.Y.F., & Georgiou, T. (2009). Exploring the validity of a teachers' self-efficacy scale in five countries. *Contemporary Educational Psychology*, 24, 67-76.
- Knobloch, N. A., & Whittington, M. S. (2002). Novice teachers' perceptions of support, teacher preparation quality, and student teaching experience related to teacher efficacy. *Journal of Vocational Education Research*, 27(3), 331-341.
- Köksal, N. (2013). Competencies in teacher education: Preservice teachers' perceptions about competencies and their attitudes. *Educational Research and Reviews*, 8(6), 270-276.
doi:<http://dx.doi.org/10.5897/ERR12.197>
- Kukla-Acevedo, S. (2009). Do teacher characteristics matter? New results on the effects of teacher preparation on student achievement. *Economics of Education*, 28(1), 49-57.
- Lake, V. E., & Kelly, L. (2014). Female preservice teachers and mathematics: Anxiety, beliefs, and stereotypes. *Journal of Early Childhood Teacher Education*, 35(3), 262-275.
doi:10.1080/10901027.2014.936071
- Levine, A. (2006). *Educating school teachers*. Washington, D.C.: The Education Schools Project.

- Loewen, D. A. (2013). *The relationship of motivational values of math and reading teachers to student test score gains*. (Order No. 3567302, Kansas State University). Retrieved from <http://search.proquest.com/docview/1417771912?accountid=12085>. (1417771912).
- Lohman, J. (2010). *Comparing No Child Left Behind and Race To The Top*. Retrieved from <http://www.cga.ct.gov/2010/rpt/2010-r-0235.htm>
- Liu, F. (2008). Impact of online discussion on elementary teacher candidates' anxiety towards teaching mathematics. *Education, 128*, 614-629.
- Lively, M. J. A. (1994). *Self-efficacy of teacher education students: A study based on Bandura's social cognitive theory* (Order No. 9518411). Available from ProQuest Dissertations & Theses Global. (304124158). Retrieved from <http://search.proquest.com/docview/304124158?accountid=12085>
- Maher, T. P. (2009). *A study of the influence of a preservice science teacher education program over time*. (Order No. 3357749, North Carolina State University). Retrieved from <http://search.proquest.com/docview/304964284?accountid=12085>. (304964284).
- Malinsky, M., Ross, A., Pannells, T., & McJunkin, M. (2006). Math anxiety in pre-service elementary school teachers. *Education, 127*(2), 274-279.
- McGrath, C., & Rust, J. (2002). Academic achievement and between-class transition time for self-contained and departmental upper-elementary classes. *Journal of Instructional Psychology, 29*(1), 40.
- McGuinn, P. (2012). Stimulating reform: Race to the top, competitive grants and the Obama education agenda. *Educational Policy, 26*(1), 136-159. doi:10.1177/0895904811425911

- McLennan, B., Mcilveen, P., & Perera, H. N. (2017). Pre-service teachers' self-efficacy mediates the relationship between career adaptability and career optimism. *Teaching and Teacher Education, 63*, 176-185.
- Miller, N. C., Thompson, N. L., & Xu, J. (2012). In the middle: Elementary education preservice teachers' experiences, efficacy, and interest in the education of young adolescents. *Middle Grades Research Journal, 7*(4), 15-30. Retrieved from <http://search.proquest.com/docview/1458788075?accountid=12085>
- Mueller, M., & Hindin, A. (2011). An analysis of the factors that influence preservice elementary teachers' developing dispositions about teaching all children. *Issues in Teacher Education, 20*(1), 17-34. Retrieved from <http://search.proquest.com/docview/864733190?accountid=12085>
- Munday, R. & Windham, R. (1995). Stress management training for preservice secondary teachers. *Journal of Instructional Psychology, 22*(2), 141.
- Newton, K. J., Leonard, J., Evans, B. R., & Eastburn, J. A. (2012). Preservice elementary teachers' mathematics content knowledge and teacher efficacy. *School Science & Mathematics, 112*(5), 289-299.
- Nigidi, D. P., & Sibaya, P. T. (2003). Student teacher anxieties related to practice teaching. *South African Journal of Education, 23*(1), 18-22.
- No Child Left Behind (NCLB) Act of 2001, Pub. L. No. 107-110, § 115, Stat. 1425 (2002).
- Oh, S. (2011). Preservice teachers' sense of efficacy and its sources. *Psychology, 2*(3), 234-239.
- Onchwari, J. (2010). Early childhood inservice and preservice teachers' perceived levels of preparedness to handle stress in their students. *Early Childhood Education Journal, 37*(5), 391-400. doi:<http://dx.doi.org/10.1007/s10643-009-0361-9>

- Oral, B. (2012). Student teachers' classroom management anxiety: A study on behavior management and teaching management. *Journal of Applied Social Psychology, 42*(12), 2901-2916.
- Owens, M., Stevenson, J., Hadwin, J. A., & Norgate, R. (2012). Anxiety and depression in academic performance: An exploration of the mediating factors of worry and working memory. *School Psychology International, 33*(4), 433-449.
- Parsons, J. S. (1973). *Assessment of anxiety about teaching using the teaching anxiety scale: Manual and research report.*
- Peterson, P. E., & Carlos, X. L. (2010). State standards rise in reading, fall in math. *Education Next, 10*(4) Retrieved from <http://search.proquest.com/docview/1237828145?accountid=12085>
- Post, T. R., Harel, G., Behr, M. J., & Lesh, R. (1991). Intermediate teachers' knowledge of rational number concepts. In E. Fennema, T. P. Carpenter, & S. J. Lamon (Eds.). *Integrating research on teaching and learning mathematics* (pp. 177-198). Albany, NY: SUNY Press.
- Powell-Moman, A., & Brown-Schild, V. (2011). The influence of a two-year professional development institute on teacher self-efficacy and use of inquiry-based instruction. *Science Educator, 20*(2), 47-53. Retrieved from <http://search.proquest.com/docview/1017892906?accountid=12085>
- Preston, C. (2017). University-based teacher preparation and middle grades teacher effectiveness. *Journal of Teacher Education, 68*(1), 102-116.
doi:10.1177/0022487116660151

- Rahman, F., Nabi, B. J., Akhter, Y., Hasan, S. U., & Ajmal, M. (2011). Relationship between training of teachers and effectiveness teaching. *International Journal of Business and Social Science*, 2(4).
- Reyes-Guerra, D., & Lochmiller, C. R. (2016). Faculty perceptions of race to the top policy influence on a university-based preparation program partnership. *Journal of Research on Leadership Education*, 11(3), 272-297. doi:10.1177/1942775115590688
- Richardson, A. R. (2008). *An examination of teacher qualifications and student achievement in mathematics*. (Order No. 3333147, Auburn University).
- Rogers-Haverback, H., & Mee, M. (2015). Reading and teaching in an urban middle school: Preservice teachers' self-efficacy beliefs and field-based experiences. *Middle Grades Research Journal*, 10(1), 17-30. Retrieved from <http://search.proquest.com/docview/1691158210?accountid=12085>
- Ross, J. A. (1994). The impact of an inservice to promote cooperative learning on the stability of teacher efficacy. *Teaching and Teacher Education*, 10(4), 381-394.
- Sanger, M. N., & Osguthorpe, R. D. (2011). Teacher education, preservice teacher beliefs, and the moral work of teaching. *Teaching and Teacher Education*, 27(3), 569-578.
- Shuls, J. V., & Trivitt, J. R. (2015; 2013). Teacher effectiveness: An analysis of licensure screens. *Educational Policy* 29(4), 645-675. doi:10.1177/0895904813510777
- Sloan, T. R. (2010). A quantitative and qualitative study of math anxiety among preservice teachers. *The Educational Forum*, 74(3), 242-256. Retrieved from <http://search.proquest.com/docview/742622161?accountid=12085>
- Sloan, T., Daane, C. J., & Giesen, J. (2002). Mathematics anxiety and learning styles: What is the relationship in elementary preservice teachers? *School Science and*

- Mathematics*, 102(2), 84-87. Retrieved from
<http://search.proquest.com/docview/195205556?accountid=12085>
- Steele, A., Brew, C., Rees, C., & Ibrahim-khan, S. (2013). Our practice, their readiness: Teacher educators collaborate to explore and improve preservice teacher readiness for science and math instruction. *Journal of Science Teacher Education*, 24(1), 111-131.
doi:<http://dx.doi.org/10.1007/s10972-012-9311-2>
- Steen, L. A. (2003). Math education at risk. *Issues in Science and Technology*, 19(4), 79.
- Superfine, B. M., Gottlieb, J. J., & Smylie, M. A. (2012). The expanding federal role in teacher workforce policy. *Educational Policy*, 26(1), 58-78.
- Swackhamer, L. E. (2009). *An investigation into the influences on mathematics teacher efficacy in elementary teachers: A mixed methods study* (Order No. 3360863). Available from ProQuest Central; ProQuest Dissertations & Theses Global; ProQuest Social Sciences Premium Collection. (305092820). Retrieved from
<http://search.proquest.com/docview/305092820?accountid=12085>
- Swackhamer, L. E., Koellner, K., Basile, C., & Kimbrough, D. (2009). Increasing the self-efficacy of inservice teachers through content knowledge. *Teacher Education Quarterly*, 36(2), 63-78.
- Swars, S., Daane, C. J., & Giesen, J. (2006). Mathematics anxiety and mathematics teacher efficacy: What is the relationship in elementary preservice teachers? *School Science & Mathematics*, 106(7), 306-315.
- Szabo, S. M., & Mokhtari, K. (2004). Developing a reading teaching efficacy instrument for teacher candidates: A validation study. *Action in Teacher Education*, 26(3), 59-72.

- Tchoshanov, M. A. (2011). Relationship between teacher knowledge of concepts and connections, teaching practice, and student achievement in middle grades mathematics. *Education Studies in Mathematics*, 78(2), 141-164.
- Tschannen-Moran, M., Woolfolk Hoy, A., & Hoy, W.K. (1998). Teacher efficacy: Its meaning and measure. *Review of Educational Research*, 68, 202-208.
- U. S. Copyright Office (2011). Copyright law of the United States and the related laws contained in Title 17 of the United States code. Washington, DC. Retrieved from <http://copyright.gov/title17/circ92.pdf>
- U. S. Department of Education (2000). Before it's too late: A report to the nation from the national commission on mathematics and science teaching for the 21st century. Washington, DC. Retrieved from <http://www.ed.gov/americaaccounts/glenn>
- U.S. Department of Education, Elementary & Secondary Education (ESEA) (2010). *A blueprint for reform: The Reauthorization of the elementary and secondary education act*. Retrieved from <http://www.ed.gov/ESEABlueprint>
- U.S. Department of Education, Institute of Education Sciences, National Center for Education Statistics, National Assessment of Educational Progress (NAEP) 2009 Reading and Mathematics Assessments. (2009). *Consolidated state performance report part I*. Retrieved from <http://www2.ed.gov/admins/lead/account/consolidated/sy08-09part1>
- U.S. Department of Education, Institute of Education Sciences, National Center for Education Statistics, National Assessment of Educational Progress (NAEP). (2011). *Science 2011: National assessment of education progress at grade 8*. Retrieved from <http://nces.ed.gov/nationsreportcard/pdf/main2011/2012465.pdf>

- University of West Alabama. (2012). *Fall 2012 student body demographics*. Retrieved from http://www.uwa.edu/Fall_2012.aspx
- Velthuis, C., Fisser, P., & Pieters, J. (2014). Teacher training and pre-service primary teachers' self-efficacy for science teaching. *Journal of Science Teacher Education*, 25(4), 445-464.
- West, S. L. (1994). The effect of the student teaching experience upon preservice elementary teachers' attitude and anxiety involving science and science teaching. *SRATE Journal*, 3(2), 31-37.
- Wheatley, K. F. (2002). The potential benefits of teacher efficacy doubts for educational reform. *Teaching and Teacher Education*, 18, 5-22.
- Wheatley, K. F. (2005). The case for reconceptualizing teacher efficacy research. *Teaching and Teacher Education*, 21, 747-766.
- Wiens, P. D., & Ruday, S. (2014). Personality and preservice teachers: Does it change, does it matter? *Issues in Teacher Education*, 23(2), 7-27. Retrieved from <http://search.proquest.com/docview/1690912610?accountid=12085>
- William Carey University (2017). *School of education*. Retrieved from <https://www.wmcarey.edu/school/education>
- Wiseman, D. L. (2012). The intersection of policy, reform, and teacher education. *Journal of Teacher Education*, 63(2), 87-91.
- Xu, Z., Hannaway, J., & Taylor, C. (2007). *Making a difference? The effects of teach for America in high school*. (Calder working paper #17) Calder Urban Institute: Washington D.C. Retrieved from http://www.urban.org/UploadedPDF/411642_Teach_America.pdf

Zee, M., & Koomen, H. M. Y. (2016). Teacher self-efficacy and its effects on classroom processes, student academic adjustment, and teacher well-being: A synthesis of 40 years of research. *Review of Educational Research*, 86(4), 981-1015.

Appendix A

Permissions

Permission to use the RTEI and the MTEBI were obtained through email communications.

Below are copies of the email communications for RTEI permissions:

Susan Szabo <Susan.Szabo@tamuc.edu>

Sun 9/28/2014 9:43 PM

Ms. Miller,

I will give you permission to use our Reading Teaching Efficacy Instrument (RTEI, Szabo & Mokhtari, 2004) as long as you put our name and date of copyright on all copies of the survey and cite it correctly in the body of your dissertation.

Good luck with your dissertation.

Dr. Susan Szabo

susan.szabo@tamuc.edu

Co-coordinator of Doctoral Program

Associate Professor

Kouider Mokhtari <kmokhtari@uttyler.edu>

Sun 9/28/2014 2:22 PM

Hi Lamarcia

My I suggest that Dr. Szabo complete the form, then send it to me and I will sign as a second author. I'm copying her so that we can coordinate this effort.

Kouider

Kouider Mokhtari, Anderson-Vukelja-Wright Endowed Professor

The University of Texas at Tyler

School of Education

Tyler, Texas 75799

(903) 566-7177

Below are copies of the email communications for MTEBI permissions:

lgreeval@gmail.com

Mon 9/29/2014 6:08 PM

To: Miller, Lamacia Jan;

Just certainly are permitted use the instrument.

Sent from my iPhone

Sent Items

Dr. Enochs,

My name is Lamacia Miller and I am a doctoral student at Liberty University. I mistakenly contacted Dr. Iris Riggs requesting permission to use the MTEBI in my doctoral research.

Through that contact, I was sent your contact information as the true author of this instrument. I am proposing a study that will investigate the relationship between number of course hours and self-efficacy/anxiety in perservice math and reading teachers. I believe that your instrument would be a highly useful tool, and am therefore requesting permission to use this tool. Of course, the tool will contain all correct copyright information along with proper citation.

Thank you for your consideration,

Lamacia Miller
Doctoral Student
Liberty University

After many attempts at finding the author of the Teaching Anxiety Scale, Jane Parsons, and attempts to find any organization that claims to have a copyright on this instrument, it has been determined that the author of the instrument is unreachable and that the copyright holder of this instrument is also unreachable. Based on the US copyright laws, section 107, the researcher holds that use of this instrument for educational research purposes is allowed (U. S. Copyright Office, 2011).

Appendix B

IRB Approval

LIBERTY UNIVERSITY

INSTITUTIONAL REVIEW BOARD

October 6, 2016

Lamarcia Miller

IRB Exemption 2520.100616: Elementary Pre-Service Teacher Preparedness in Literacy and Mathematics as it Relates to Anxiety and Self-Efficacy

Dear Lamarcia Miller,

The Liberty University Institutional Review Board has reviewed your application in accordance with the Office for Human Research Protections (OHRP) and Food and Drug Administration (FDA) regulations and finds your study to be exempt from further IRB review. This means you may begin your research with the data safeguarding methods mentioned in your approved application, and no further IRB oversight is required.

Your study falls under exemption category 46.101(b)(2), which identifies specific situations in which human participants research is exempt from the policy set forth in 45 CFR 46:101(b):

- (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.

Please note that this exemption only applies to your current research application, and any changes to your protocol must be reported to the Liberty IRB for verification of continued exemption status. You may report these changes by submitting a change in protocol form or a new application to the IRB and referencing the above IRB Exemption number.

If you have any questions about this exemption or need assistance in determining whether possible changes to your protocol would change your exemption status, please email us at irb@liberty.edu.

Sincerely,

G. Michele Baker, MA, CIP
Administrative Chair of Institutional Research
 The Graduate School

LIBERTY
 UNIVERSITY
Liberty University | Training Champions for Christ since 1971

Appendix C

Informed Consent Form

The Liberty University Institutional
Review Board has approved
this document for use from
10/6/2016 to –
Protocol # 2520.100616

CONSENT FORM

ELEMENTARY PRE-SERVICE TEACHER PREPAREDNESS IN LITERACY AND MATHEMATICS AS IT RELATES TO ANXIETY AND SELF-EFFICACY

Lamarca J Miller
Liberty University
School of Education

You are invited to be in a research study that will investigate whether the number of course hours taken by elementary education pre-service teachers in literacy and in mathematics have any relationship to the level of anxiety and the level of self-efficacy these teachers feel when teaching literacy and mathematics during student teaching. You were selected as a possible participant because you are enrolled in a university elementary education student teaching program. I ask that you read this form and ask any questions you may have before agreeing to be in the study.

Lamarca Miller, a doctoral candidate in the School of Education at Liberty University, is conducting this study.

Background Information: The purpose of this study is to determine if there is a statistically significant correlation between the number of course hours a teaching student takes in literacy and mathematics and the level of anxiety and self-efficacy that the pre-service teacher feels when contemplating teaching these subjects.

Procedures: If you agree to be in this study, I would ask you to do the following things:

1. Complete a brief demographic questionnaire
2. Complete the Student Teacher Anxiety Scale
3. Complete the Reading Teaching Efficacy Instrument
4. Complete the Mathematics Teaching Efficacy Beliefs Instrument.

This should take no longer than 30 minutes to complete.

Risks and Benefits of being in the Study: There is minimal risk involved in this study. There are no direct benefits for participation in this study. The results of the study may benefit future pre-service teachers as they prepare to enter the classroom.

Compensation: You will receive no compensation for taking part in this study.

Confidentiality: The records of this study will be kept private. In any sort of report I might publish, I will not include any information that will make it possible to identify a subject. Research records will be stored securely and only the researcher will have access to the records. Because no names will be associated with the information collected, the risk of a breach of confidentiality will be minimal. All information collected electronically will be password protected and stored on a password protected device. Please be assured that all measures will be in place to ensure complete anonymity of every participant, and your name will not be requested or recorded in any research document. Confidentiality of the completion of these documents will

The Liberty University Institutional
Review Board has approved
this document for use from
10/6/2016 to --
Protocol # 2520.100616

be maintained by the researcher. All data collected for this study becomes the property of the researcher.

Voluntary Nature of the Study: Participation in this study is voluntary. Your decision whether or not to participate will not affect your current or future relations with Liberty University. If you decide to participate, you are free to not answer any question or withdraw at any time without affecting those relationships.

Contacts and Questions: The researcher conducting this study is Lamacia Miller. You may ask any questions you have now. If you have questions later, you are **encouraged** to contact her at 601-604-4692 or mmiller@lauderdale.k12.ms.us. You may also contact the researcher's faculty advisor, Araceli Montoya, at agmontoya@liberty.edu.

If you have any questions or concerns regarding this study and would like to talk to someone other than the researcher, you are **encouraged** to contact the Institutional Review Board, 1971 University Blvd, Green Hall 1887, Lynchburg, VA 24515 or email at irb@liberty.edu.

Please notify the researcher if you would like a copy of this information to keep for your records.