MATHEMATICS EDUCATION IN RURAL MIDDLE SCHOOLS: PARENT PERCEPTIONS

OF THEIR ROLE IN MATHEMATICS LEARNING

A Dissertation

by

AUSTRAI BRADLEY

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ABSTRACT

MATHEMATICS EDUCATION IN RURAL MIDDLE SCHOOLS: PARENT PERCEPTIONS OF THEIR ROLE IN MATHEMATICS LEARNING

(August 2017)

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This qualitative study explored parent perceptions of parental involvement in mathematics learning. The study was conducted in a rural area of South Carolina. Face-to-face interviews, online interviews, and review of documents were the sources of data for this inquiry. Findings revealed that parents admitted to a lack of involvement as long as their child met grade expectations. A number of parents suggested that their role was to assist, facilitate, and supplement the teacher's delivery of mathematics instruction in the classroom. In addition, parents viewed the teacher's role in the same manner, but just within a different environment. Furthermore, parents notably emphasized that reading comprehension was the foundation of other academic subjects. Research recommendations include a continued investigation in other rural school districts in other states, a comparative study of parental involvement in mathematics learning in urban and rural middle schools, a relative study of parental involvement in mathematics learning in elementary and middle schools, and a study that compares parental involvement in mathematics learning at the middle school level and the high school level.

DEDICATION

I dedicate this manuscript to my mother, Shirley Ann Bradley. My mom pushed me to do any and everything I thought that I could do. When it came to my mind, she declared, "You can do it!" If I tried it and fell down, she would pick me back up to try it again. Every single day, my mother encouraged me. When it came to my academics, my mom checked to make sure I had all my work done. If she couldn't help me, my mother found someone who might.

This wonderful lady was so involved in my academics, as well as my extra-curricular life events throughout all grade levels, including my years in college. Any event that involved me, she was there - from cheerleading, to parent conferences, award programs, and step shows.

So when I decided that I was going to obtain my doctorate degree, she said, "Well baby, you can do it." That was all I needed, and now I can say, "Well mama, I did it."

ACKNOWLEDGEMENTS

I want to thank the Lord for granting me the wisdom, knowledge, and sanity that I needed to make my dream come true. He kept me through it all and gave me strength during the times I wanted to give up. I thank God for my family and friends. When you have people who believe in you, giving up is not an option. I cannot express the love and appreciation that resides in my heart. I began this voyage with an amazing group of people, Cohort V, who remained positive and helpful through it all. They were willing to do whatever it took to make sure we all made it to the finish line. Some finished ahead of others, but the support never stopped, and neither did the encouragement. Throughout all hours of the night, a quick message in the group app yielded a response. My family is big, and now it is even bigger.

I have so many words that I can use to describe the feelings I have for my advisor and Dissertation Committee Chair, Dr. Stephanie Johnson, but I would be typing all day. She is such a remarkable woman of God who encouraged me, loved on me, and made sure I was balanced academically, physically, and spiritually. She never gave up on me, even when I wanted to give up on myself. Often, she would call and say, "Miss America, I have not heard from you. Tell me what's going on. Where are you in the writing process?" I wrote, because I had to tell her something. She is such a profound educator and mentor that I began to mirror her when it came to my career. The wisdom and knowledge she placed in me can never be replaced. Additionally, I would also like to thank my dissertation committee members: Dr. Ivy Lee, Dr. Tomeka Wilcher, and Dr. Jean Jones. Their support and encouragement was vital to me completing the process.

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LIST OF ACRONYMS

AYP	Adequately Yearly Progress
AKRSI	Alaska Rural Systemic Initiative
CCSS	Common Core State Standards
CRTT	Culturally Responsive Teaching Theory
DV	Dependent Variables
ERIC	Educational Resource Information Center
IV	Independent Variables
LIT	Local Instruction Theory
LEA	Local Education Agency
MAP	Measures of Academic Progress
NAEP	National Assessment of Educational Progress
NCTM	National Council of Teachers of Mathematics
NCLB	No Child Left Behind
NEA	National Education Association
NSF	National Science Foundation
OMB	Office of Management of Budget
PASS	Palmetto Assessment of State Standards
PCSD	P. Clark School District
PRISM	Priorities in School Mathematics
RME	Realistic Mathematics Education
RSI	Rural Systemic Initiative
SAT	Scholastic Aptitude Test
SEA	State Educational Agency
SES	Socioeconomic Status
SLICE	South Carolina Longitudinal Information Center
SMPY	Study of Mathematically Precocious Youth
SPSS	Statistical Package for the Social Sciences
TIMSS	Third International Mathematics and Science Study

CHAPTER 1

INTRODUCTION

The National Mathematics Advisory Panel (2008) expressed the increasing importance of mathematical proficiency for the complete well-being and prosperity of the nation. Prior to 2001, research pertaining to the field of rural mathematics education was nonexistent. However, since then, reform programs such as the Rural Systemic Initiative (RSI) funded by the National Science Foundation, were created in order to improve this deficiency in mathematics education research (Waters, Howley, & Schultz, 2008). Quintos (2003) recognized concerns relating to mathematics, and the connection of parental involvement to mathematics reform (as cited by Appelbaum (1999), Lehrer and Shumow (1997), and Peressini (1997, 1998). Little attention has been given to mathematics achievement and parental involvement in the rural environment. Altschul (2011) declared that children's home situations influence their attitudes toward mathematics (as cited in Sheldon & Epstein, 2005). Additionally, Altschul (2011) conveyed parent's beliefs and expectations could express an outcome in advance regarding student achievement in elementary and middle school mathematics (as cited Sheldon & Epstein, 2005). Nevertheless, parental involvement tends to decline as mathematics progressively evolves throughout the grade levels (Altschul, 2011). Although, parental involvement has been studied, the literature is absent of a common definition. Further, a void exists in the research on the specificity of parental involvement, and its influence on mathematics achievement.

Jeynes (2014) acknowledged that while the government began identifying parental involvement as one of the most vital components in improving academics, “a spate of national task force reports”, epitomized by *A Nation at Risk,* reiterated the rising need to connect the child’s home life with school expectations (National Commission on Excellence in Education,

1983). Fan and Williams (2010), as cited in Roberts (2013) found that parental involvement had a positive relationship to students' academic engagement, self-efficacy toward mathematics, and intrinsic motivation toward mathematics. Current and past policy targeted at improving the academic achievement of students in K-12 learning environments usually center on increasing parental involvement (Altschul, 2011). The federal No Child Left Behind (NCLB) Act of 2001 acknowledged parental involvement as an essential part of improving academic outcomes, specifically for students attending schools in rural, or low-income areas (Altschul, 2011). In the 2017, "Trends in International Mathematics and Science Study", Hiebert, emphasized the importance of incorporating culturally relevant activities and family involvement in mathematics teaching (Waters et al., 2008). The 2004 federal publication, "Parental Involvement: Action Guide for Parents and Communities", defined parental involvement as a meaningful, two-way communication strategy involving student academic learning and other school activities, including but not limited to assisting in their child's learning, and being actively involved in their child's education at school. Parents should also be involved in the act of serving as full partners in their child's education, and included, as appropriate, in decision-making, and on advisory committees to assist in the education of their child, while carrying out of other activities such as those described in section 1118 of the ESA Section 9101 (32).

Mathematics education research has been conducted for decades; however, research pertaining to rural concerns is meager (Waters, Howley, & Schultz, 2008). The Educational Resource Information Center (ERIC) reveals, that out of five thousand mathematics education research reports, and three thousand reports related to rural education, only twenty reports represented the intersection of the two (Waters et al., 2008).

A review of the literature on mathematics in rural educational environments revealed a

void in the research addressing achievement at the middle school level (Waters et al., 2008). With school reform at the forefront of the educational focus for the last few years, education and policy leaders have neglected to give much needed attention to middle school development (Williams, Kirst, & Haertel, 2010). Research suggests that middle school students begin to perform inadequately in crucial subject areas such as mathematics (Williams et al., 2010). Since NCLB, states have been required to increase rigor by implementing Common Core Mathematical Standards as an effort to increase student achievement, and unify all fifty states' mathematical expectations of students (Ackerman & Peterson, 2015). Although a majority of states has established a more rigorous mathematics curriculum, students are still not performing at the National Assessment of Educational Progress' definition of proficiency (Ackerman & Peterson, 2015).

Scores from the South Carolina Palmetto Assessment of State Standards illustrate that students attending rural schools in South Carolina have constantly performed below grade level in mathematics (South Carolina Department of Education, 2015). As a result, many students are unable to compete academically against their grade level peers in other states, and are likely to face challenges in college and careers. Several factors identify academic success. These include characteristics such as parental involvement, family attitudes, socio-economic status, school setting, and the education level of family members (Herrell, 2011). Parental involvement in a child's school experience has the ability to influence the quality and tenure of schooling a child receives (Degner, 2013). Research suggests that the role of the parent as motivator and monitor has a substantial influence on the student's mathematics achievement (O'Sullivan, Chen, & Fish, 2014).

Statement of the Problem

Little is known about role of the parent in assisting students academically in the content area of mathematics in rural public middle school settings. While there are varying definitions of parental involvement, and development of involvement policies offered by educators, there often remains a disconnect between how educators and parents define parental involvement, as it relates to mathematics education.

Background of the Problem

School accountability, which is based on student academic performance, is the centerpiece of education policy in the United States (Figlio & Loeb, 2011). State and federal entities evaluate schools using accountability measures (Figlio & Loeb, 2011). Since 2001, federal laws have required that all states administer tests to students in grades 3 through 8 to assess math and reading achievement (Ackerman & Peterson, 2015). According to the National Assessment of Education Progress (NAEP), the average 8th grade mathematics score has increased slightly over the last few decades; however, 8th grade students in rural areas performed similar to those in urban areas, but significantly lower than their suburban counterparts (National Center for Education Statistics, 2014). Compared to the 5.8 million students attending urban schools in the year 2010, over 12 million students attended rural schools.

Driven by national and global assessments, political and educational management teams "spurred into action" (Grady, Watkins, & Montalvo, 2012). Trends in the International Mathematics and Science Study (TIMSS) and the Program for International Student Assessment (PISA) results display below average, to average results from America's scholars (National Center for Education Statistics, 2013). Educational decision makers have criticized the United States' public education system, and have pressured schools to reform mathematics instruction,

in order for the country's students to compete with their peers globally (Grady et al., 2012).

After two years of critical analysis, the National Mathematics Advisory Panel (2008) confirmed that schools in the United States were not properly delivering effective instruction in mathematics. The board confirmed that the mathematics education system was critically wounded and needed healing (U.S. Department of Education, 2008). United with the immoderately low mathematical performance of ethnically diverse students living in low-income communities (Hanushek & Rivkin, 2009), the study noted a dire need to alleviate the negative effects of mathematics anxiety (Vukovic, Roberts, & Wright, 2013).

Past and current research studies affirm that parental involvement in a child's education is an essential factor in that child's success in school. In 2006, the Parent Involvement Work Team of the South Carolina Council on Competitiveness' Education and Workforce Development Task Force identified, displayed, and advocated best practice programs that increase parental involvement in children's education, with particular emphasis on underachieving students (South Carolina Council on Competitiveness, 2006). Additionally, the 2012 South Carolina Palmetto Assessment of State Standards indicated that students perform significantly better in Mathematics at the elementary level compared to middle grades. As students advance from grade 3 to grade 8, more begin to perform below grade level and the percentages of students performing above grade level diminish (South Carolina's coalition, n.d.). The 2012 Mathematic Elementary PASS scores affirm that there is not much of a discrepancy in the scores between genders. However, once in middle school, the females' scores are better than their male counterparts' scores (South Carolina Department of Education, 2015).

In South Carolina, there were approximately 100,000 students in urban schools, while

the rural population was triple that amount (National Center for Education Statistics, 2010). Eighty percent of students in the rural districts of South Carolina receive free or reduced lunch (South Carolina's Coalition, n.d.). The 2011 National Assessment of Educational Progress (NAEP) sustains that in 3rd grade about 30% of these students performed below grade level and in 8th grade that number increased to 43%. These statistics show that mathematics education in elementary schools requires attention; however, middle grades command more consideration (National Assessment, n.d.). Previous research has illustrated a positive association amongst parental involvement and academic research. In contrast, current and emerging research reveal a more multifaceted depiction of the relationship (Hong, Yoo, You, & Wu, 2010). However, other research revealed that not every type of parental involvement has a positive influence on academic achievement (Hong et al., 2010). Yet, a disconnect is still present on national and local levels regarding ways that educators and parents define parental involvement as it relates to mathematics education.

Purpose of the Study

The purpose of this qualitative, phenomenological study was to explore how parental involvement influences the development of students' learning mathematical skills in rural schools in South Carolina from the parental perspective. Building on previous research that seeks to understand how parental involvement influences children's academic achievement, this study was designed to extend the literature by examining and identifying the role of the parent in developing their child's mathematical skills in rural public middle schools.

Research Questions

To achieve the purpose of this study, the researcher explored the following research questions:

RQ 1: What is the role of the parent in assisting and developing mathematical learning in a rural public middle school in South Carolina?

RQ 2: How do parents perceive the role of the teachers in the students' mathematics learning?

RQ3: How do parents prioritize the importance of math and other academic subjects?

Theoretical Framework

This investigation used three theories to help identify and determine the parents' ideas of effective parental involvement as it relates to mathematics education. Research recognizes parental involvement as an important factor in the quality of a child's education. Epstein's School-Family-Community Partnership Model is an influential model in parental involvement research (Hernandez, 2011). However, for this study, an extension of the model, Epstein's School-Family-Community Partnership in the Middle Grades is the overarching framework strengthened. Brofenbrenner's Bioecological Model of Human Development, and Freudenthal's Theory of Realistic Mathematics Education support Epstein's extended model. Figure 1 illustrates the organization of the theoretical framework as it applies to the study.

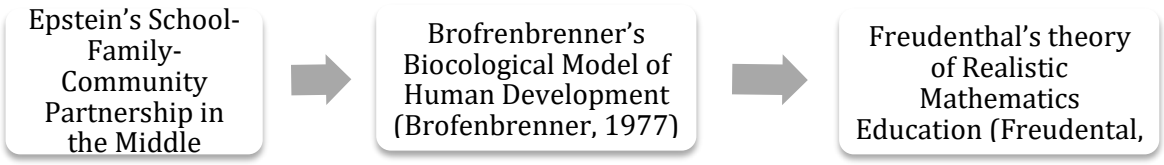

Figure 1. Theoretical Framework for Abstracting Family Partnership, Human Development, and Mathematics.

Epstein's School-Family-Community Partnership Model emphasizes the connection between the family, the school, and the community, with the child being at the center. The factors of time, experiences at home, at school, and in the community affect the development of the child (Hernandez, 2011). Epstein (2001) believes there is a need for a cohesive and interdependent connection in school-to-home relationships in order for the child to be successful. Changes in the environment of the school can help parents become more developmentally prepared to help their child be successful in school (Epstein, 2001). However, there must be intention in developing a school-to-home connection that promotes parental involvement in the education process.

Research has shown that family (parental) involvement is vital to student learning, development, and academic success across all grade levels (Hernandez, 2011). Although, most families desire and require more information about early adolescence and middle level education, very few families stay connected as active partners in the middle grades (Epstein, 2005). Epstein (2001), founder of the National Network of Partnership Schools, created a model framework that identifies six types of parental involvement: a) Parenting: Help all families to support children as students; b) Communicating: Design effective forms of school-to-home and home-to-school communications about school programs and children's progress; c)

Volunteering: Recruit and organize parent help and support; d) Learning at home: Provide information and ideas to families about how to help students at home with homework and other curriculum-related activities, decisions, and planning; e) Decision-making: Include parents in school decisions, developing parent leaders and representatives; f) Collaborating with the community: Identify and integrate resources and services from the community to strengthen school programs, family practices, and student learning and development. A majority of the current research and resulting theories on parental involvement have been derived from this framework (Epstein, 2001).

Urie Brofenbrenner's Bioecological Model of Human Development was created in 1977 and focuses on the impact that environment, coupled with biology, has on an individual's development. Brofenbrenner changed developmental psychology by drawing attention to the significant number of environmental influences that are essential components in the development of a child, inclusive of the people and institutions the child encounters (Brofenbrenner and Morris, 2006). Brofenbrenner created a framework that scholars can use to distinguish and categorize the various developments that influence child development. The framework begins with the P-P-C-T Model, and has four major components: process, person, context, and time: (Krishnan, 2010). The process component involves the interactions between an individual and the family environment. The second component, which is person, encompasses the student and biological characteristics (including age, gender, appearance, intelligence, skills, perseverance, etc.) The last two components, context and time, encompass multiple venues that adjust specific processes. These include the environment in which the child interacts physically, socially, or economically. Additionally, four distinct systems have an influence, either a direct or indirect, on the development of the child. Those systems are micro, meso, exo, and macro (Krishnan,

2010). Figure 2 illustrates the systems and the spheres of influence related to child development.

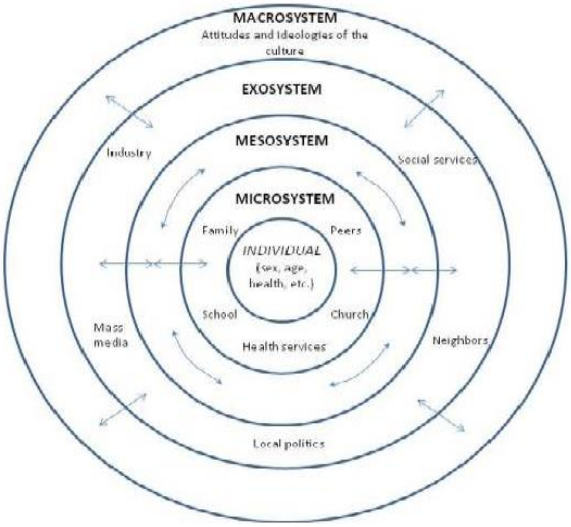

Figure 2. Brofenbrenner's Bioecological Model.

Freudenthal's Theory of Realistic Mathematics Education (RME) suggests that in order to be of human value, mathematics must be linked directly to reality, connected to children, and relevant to society (Van den Heuvel-Panhuizen, 1998). Connecting to reality does not mean that the student will encounter such situations in everyday life, but there is a need to understand the context of the problem intuitively (Johnson, 2013). RME is an instructional design theory grounded in the belief that students' formal mathematics skills can be developed by engaging in mathematical activities that will progressively expand students' common sense (Johnson, 2013). Freudenthal believed that mathematics was approached as a closed system, and students were given ready-made mathematics when they should be allowed to participate in the education process by creating mathematics strategies and understandings on their own (Freudenthal, 1973 as cited in Barnes, 2005). Therefore, he proposed that mathematics activity should entail mathematizing and organizing subject matter that comes from students' perception of reality

(Barnes, 2005).

Definition of Terms

Math Performance – The term refers to how well students apply the knowledge and skills they have acquired. Instructors gauge the level to which benchmarks have been attained in terms of range, frequency, facility, depth, creativity, and quality. Achievement of curricular goals is assessed by the performance descriptors (National Center for Education Statistics, 2013).

No Child Left Behind (NCLB): This term denotes the Federal legislation that enacted regular standards and educational benchmarks based on education reform based on the expectation of goal setting to enhance student success and academic improvement. NCLB requires each state to create assessments in basic skills given to all students in specified grade levels to receive federal funding and financial support from the Department of Education (U.S. Department of Education, 2008).

Parental Involvement: Parental involvement is multidimensional and Grolnick and Slowiaczek (1994, as cited in Klein, 2008) define it using three domains: (1) parental behavior, (2) personal involvement, and (3) intellectual involvement. *Behavior* was related to the amount of time spent in the school environment. *Personal involvement* entailed the act of relating to and providing for a child's "affective environment" (Klein, 2008, p. 96) while learning takes place. Lastly, *intellectual involvement* involved making relevant learning opportunities available to children (Klein, 2008).

Palmetto Assessment of State Standards (PASS): As mandated in Chapter 18, Title 59 of the 1976 Code, the Education Accountability Act was amended to provide for the development of a new statewide assessment program (May 2008). This program, known as the Palmetto Assessment of State Standards (PASS), was first administered in the spring of 2009.

The PASS is administered to South Carolina public school students, including charter school students, in grades three through eight (South Carolina State Department of Education, 2014).

Rural (non-metro) Schools in the United States: Rural, for the purposes of this dissertation is defined by those school districts that, according to the Economic Research Service Rural-Urban Continuum Code and sometimes referred to as the Beale code, are assigned a locale code of four thru eight. The Rural- Urban Continuum Code assigns numbers one through nine to every school district in the country with a "1" representing a county in a metro area with a population of 1 million or more and a "9" representing a completely rural area with a population of less than 2,500 and not adjacent to a metro area (United States Department of Agriculture Economic Research Service, 2013).

Socio-economic Status: "Socio-economic status (Richland One School District Assessment Data) is often measured as a combination of education, income and occupation. It is commonly conceptualized as the social standing or class of an individual or group. When viewed through a social class lens, privilege, power, and control are emphasized. Furthermore, an examination of SES as a gradient or continuous variable reveals inequities in access to and distribution of resources" (American Psychological Association, 2014).

Student achievement: Student achievement is measured by the student's passing score on the South Carolina Palmetto Assessment of State Standard test. Students' scores are broken down into three categories: not met, met, and exemplary. Students in the met and exemplary category are performing on grade level or above (South Carolina Department of Education, 2015).

Urban (metro) Schools in the United States: Urban, for the purposes of this dissertation, is defined by those school districts that, according to the Economic Research

Service Rural-Urban Continuum Code, which is sometimes referred to as the Beale code, are assigned a locale code of one thru three. The Rural-Urban Continuum code assigns numbers one through nine to every school district in the country with a "1" representing a county in a metro area with a population of 1 million or more. A "9" score represents a completely rural area with a population of less than 2,500, and not adjacent to a metro area (United States Department of Agriculture Economic Research Service, 2013).

Limitations

The factors outside of the researcher's control are limitations. Limitations pinpoint potential weaknesses or problems with the investigation (Patton, 2015). Phenomenological investigations, such as this study, have typical limitations over which the researcher has a minimal amount of control (Patton, 2015). The following are limitations of this study: a) the results of the parent surveys issued to middle school students enrolled in traditional rural public schools located in Columbia, SC will only apply to one school. Given this information, the results cannot be generalized; b) the results may or may not be hold true for other traditional rural public schools located in the state of South Carolina; c) the study considered and analyzed only the content area of mathematics; d) the data set that was used was developed based on original data collected and reported by the South Carolina Department of Education; however, while the instrument was created to warrant objectivity, some bias was foreseeable; e) data interpretation was subject to limitations associated with the use of such data-gathering strategies and techniques. Triangulating the data collected decreased the influence of limitations on the investigation.

Delimitations

Reasons controlled by the researcher are known as the delimitations (Patton, 2015). These reasons were used to create influences for the investigation, for example demographics, instrument style, gender, age, size, and experience. The investigator used snowball sampling, as the study was confined to middle school parents with students in grades 6, 7 and 8 within a South Carolina rural school district. The study was delimited to a single content area, mathematics.

Significance of the Study

This study aspired to provide a glimpse of parent perceptions regarding effective parental involvement practices. Results from this study aimed to indicate more effective ways of meeting parental involvement requirements of the *No Child Left Behind Act*, improve communication between parents and educators, and encourage effective involvement by parents in an effort to achieve student academic success, specifically in mathematics. Furthermore, the study added to the limited body of literature regarding the subject of parental involvement and mathematics education.

Overview of the Study

There are five chapters in this inquiry. Chapter I introduced the study with orientations related to mathematics and parental involvement in rural middle schools. This chapter presented the statement of the problem, problem background, purpose statement, research questions, theoretical framework, definitions of terms, and significance of the study suggesting the scope of the planned study. Chapter II presents the review of the literature, and identifies the historical perspective and gaps in availability of research in regards to parental involvement. Chapter III specifies the selected methodology of the study. Chapter IV presents the outcome of the investigation from collected data analyzed to answer the research questions. To conclude,

Chapter V discusses conclusions, implications for practice, and recommendations for future study.

CHAPTER 2

REVIEW OF LITERATURE

Introduction

The principal objective of this study was to explore and offer research relevant to parental involvement and mathematics. The literature review identified, examined, and synthesized investigations and articles pertinent to the present study. The researcher used notable publication and research studies to address the specified factors. The investigator organized the chapter into eight categories with three categories containing subcategories.

Each category is vital for a precise understanding of this research study. The first category provided the history of parental involvement in education. Category two inspected the history of mathematics education. Category three examined the history of rural education and the subgroup of education in rural schools. Category four surveyed the history of mathematics reform, and contains a subsection on common core standards. The fifth category provided a discussion of the National Council of Teachers of Mathematics. The sixth category considered other frameworks of mathematics education. Category seven explained other factors influencing performance in mathematics education, as well as subcategories on gender, socio-economic status, and ethnic group. As a final point, the eighth category supplied theoretical connections to the study.

History of Parental Involvement in Education

Historically, a child's education has always been seen by parents, and perhaps by society as a whole, as the purview of the child's parents. The involvement of parents in education included, and still includes, activities related to discipline, basic skills, work skills, ethics, in order to instill morals and values (Hiatt-Michael, 1994). These educational activities were

carried out privately within the family, rather than publicly through public institutions (Berger, 1991).

Imitating the class structure of Britain, historically, schools in the United States were organized by the social class of parents. Majorities of established schools catered to the social demands of the upper and growing middle class, and relied on financial support from fees paid by the parents (Hiatt-Michael, 1994). During the colonial period, pilgrims insisted that education should be a implemented by parents. As early as 1642, the General Court of Massachusetts concluded that many parents neglected this responsibility; therefore, the court ordered every town to require all parents and masters to assume the education of their children. Due to the lack of success of this arrangement, in 1647 the General Court passed the Old Deluder Satan Act that required every town to set up its own school or support a school in the next larger town (Pulliam & Patten, 2007). Even though English private schools began in the 14th century and Colonial America's attempt to provide for education took place in the 1600s, mass state-supported schooling did not begin until the late 19th and early 20th centuries (Coleman, 1987). In the United States children were schooled by, in, or near their families and it primarily stayed this way through the 1940s (Comer, 1986).

As public education further developed in America, parental involvement in education changed. To many, it seemed like parents have lost control over their children's education (Hiatt-Michael, 1994). Public educational institutions appropriated and displaced this parental function, some say, to the detriment of the children and the family (Hiatt-Michael, 1994).

In 1983 the Nation at Risk report, issued by the National Commission on Excellence in Education, reminded parents that the education of children begins at home, and called on parents

to be active participants in schools and in their child's learning (National Commission on Excellence in Education, 1983). By 1984, the PTA membership had drastically dropped to approximately 5.4 million (National Parent Teacher Association, 2009). There was an increase in parental involvement in the 1990s, and it was seen as the most critical factor in educating children (Berger, 2008). PTA memberships increased to approximately 7 million (National Parent Teacher Association, 2009). During this time, the United States Department of Education encouraged stronger partnerships between families and schools as it continued to encourage family participation through federal programs such as Title I, Even Start, and the *Elementary and Secondary Education Act* (Berger, 2008).

The Office of Educational Research and Improvement (2004) presented recommendations for parents to increase involvement in their children's education in the home. Recommended activities included daily conversation about educational activities, inclusive of the delivery of messages that promote the school-to-home two-way communication. Another recommendation was to increase the nutritional education and connection between the sharing of information while sharing a snack. This strategy proved successful in helping parents to understand student interests and decision-making processes. Being an avid listener of the child was also a strategy recommended to increase parent's knowledge base about school-based happenings, as well as a way to garner support for effective school based practices that would transfer to the home.

The Office of Educational Research and Improvement also noted that scolding and arguing with children about school level occurrences was counterproductive in increasing involvement in school. However, the study noted that when parents listened and offered assistance on improving negative school situations, students became more successful in their

educational endeavors. Another strategy that improved involvement for the student and parent in the educational process was intentional planning for educational activities. For example, encouraging their child to read, setting a standard time for homework and project completion, and designating a specific place for the work to be completed, all demonstrated the parent's interest in helping the child succeed. Leaders found that ensuring students had materials and received support from parents was one of the most useful strategies in increasing involvement in the educational process (Office of Educational Research and Improvement, 2004).

Specifically for parents with middle school children, the Office of Educational Research and Improvement (2004) recommended considering relationship development with several teachers well before there is a problem at the school. In addition, the report recommended continuous contact with guidance counselors as a method to stay informed about children's behavior and progress. Staying informed about school policies, procedures, and practices outside of what is being sent home, as well as an annual review of students records, is also a useful strategy for staying informed and connected to the educational process (p. 3).

Understanding grades and test results by subject is also a way that parents can be involved to ensure student success. Parents knowing their rights, and speaking up for their children's right to a free and appropriate education (FAPE) is an essential component in being involved in the education of children (p.3). Other successful strategies that improved parental involvement in schools is the relationship development with other parents, and the establishment of support groups (Office of Educational Research and Improvement, 2004).

Current literature illustrates the positive effects of parental involvement in elementary, middle and high school students' academic achievement (Cheung & Pomerantz, 2011). Additionally, research suggests that distinctive types of parental involvement such as

communication between the parent and child, parent supervision, homework assistance and the parents' education aspirations for the student yield positive educational outcomes (O'Sullivan et al..., 2014). Cai, Moyer, and Wang, conducted a study to investigate the role of parents in students' mathematical learning at home, and to assess the relationship between students' math education and parental involvement (Cai, Moyer, & Wang, 1997).

Cheung & Pomerantz (2011) conducted a study that involved analyzing parental involvement in student learning. Eight hundred and twenty-five American and Chinese 7th grade students reported every 6 months, until the end of 8th grade, on their parental involvement in their education and their parents' psychological control and independence. One goal of the study was to examine the difference of parental involvement between parents from the United States and China. The other goal was to see if parental involvement from the American and Chinese parents had a similar effect on the students (Cheung & Pomerantz, 2011). The results indicated that the researchers' hypotheses were correct. American parents' involvement aligned more closely to their autonomous support and less with psychological control than was their Chinese parent counterparts (Cheung & Pomerantz, 2011).

O'Sullivan, Chen and Fish (2014) surveyed 79 students and parents from low-income households, and the students' mathematics teachers from an urban junior high school. The study and sought to examine the relationship between the different methods of parental involvement with low and high achieving students' mathematics homework and student's mathematics achievement. The results indicate parents' supervision is the most prevalent method of involvement in mathematics homework between both low and high achieving students (O'Sullivan et al., 2014).

There has been a constant discussion in the field of education concerning a clear and concise

definition of parental involvement. The United States government identifies parental involvement as part of the *No Child Left Behind Act (NCLB)*, currently known as the Elementary and Secondary Education Act (ESEA) (United States Department of Education, 2004). In the 2004 publication of *NCLB*, Parental Involvement: Title I, Part A Non-Regulatory Guidance, the federal government defined parental involvement as parents' participation in regular and meaningful two-way communication involving student academic learning and other school activities including but not limited to parents assisting their child's learning, encouraging parents to be actively involved in the child's education at school, and parents as full partners in their child's education and appropriately being included in decision making and serving on advisory committees to assist in the education of their child. Parental involvement also comprises carrying out other activities including those described in section 1118 of the ESEA Section 9101(32) (United States Department of Education, 2004).

History of Mathematics Education

The National Council of Teachers of Mathematics (NCTM) highlighted the need to reconstruct mathematics education in the 1980 publication, *An Agenda for Action* (Klein, 2003). The National Science Foundation financed a series of studies, including the Priorities in School Mathematics projects (PRISM), which supported the recommendations provided in *An Agenda for Action.* NCTM designed PRISM in an effort to collect data on the beliefs and reactions of the proposed mathematical curriculum changes (*Priorities in School Mathematics: Executive Summary of the PRISM Project*, 1981). Information was also retrieved from two mathematics assessments of the National Assessment of Education Progress (D. Klein, 2003).

An Agenda for Action is a document created in response to the abortive reformations in mathematics education made during 1960's (*An Agenda for Action Report*, 2004). *An Agenda*

for Action (1980) included many recommendations. The report proposed that problem-solving was the focus of school mathematics in the 1980s, and basic skills in mathematics was defined to encompass more than computational facility. It also stated that mathematics programs take full advantage of the power of calculators and computers at all grade levels and stringent standards of both effectiveness and efficiency are applied to the teaching of mathematics. Another important recommendation was to make sure the success of mathematics programs and student learning was elevated to a wider range of measures than conventional testing.

More mathematics study was required for all students and a flexible curriculum with a greater range of options be designed to accommodate the diverse needs of the student population. Also, mathematics teachers were to demand of themselves and their colleagues a high level of professionalism. Public support for mathematics instruction was raised to a level commensurate with the importance of mathematical understanding to individuals and society. (p. 1)

Every recommendation was accompanied by sub-recommendations and a specified action plan that could be used to properly implement it (*An Agenda for Action Report*, 2004).

An Agenda for Action set out to alarm the nation of the low mathematics expectations and achievements of students. However, despite the wealth of information the publication was overshadowed by another report, *A Nation at Risk* (D. Klein, 2003). In 1981, Secretary of Education, T. H. Bell, formed the National Commission on Excellence in Education. He requested that within the next two years they create a report that revealed the status of Education in America by April of 1983 (National Commission on Excellence in Education, 1983).

A Nation at Risk mirrored the accusations made by Bell that the country's public school system was failing to properly educate and prepare to students to compete globally (National Commission on Excellence in Education, 1983). It concentrated on a plethora of issues such as

student assessment, quality of teachers and training programs, more rigorous textbooks, and standardized test and accountability (D. Klein, 2003). These constant illustrations of the dire need to make significant changes to the public school system provided rationale for what is known as "education reform" (Scott, 2011).

However, before major changes in education occurred, less than 7% of America's 14 year olds attended high school. High school and other advancement programs were for the elite, so, majority of the nation was provided an elementary education, which only included the basics (Schoenfeld, 2003). As a case in point, Resnick affirmed (as cited in Schoenfeld, 2003) in 1890 a school district requested that only teaching basic mathematics, which allowed the student to serve as a clerk, would be sufficient.

In the late 1980's the focus of math curriculum shifted to critical thinking (Burris, 2014). In 1986, NCTM established the Commission on Standards for School Mathematics, which created the Curriculum and Evaluation Standards for School Mathematics, also known as the NCTM standards (National Council of Teachers of Mathematics Commission on Standards for School Mathematics, 1989). During the 1989 Education Summit, the National Science Foundation (NSF) and political leaders collaborated in support of the NCTM national standards (Klein, 2003). After years of implementing the new math principles, an international study revealed that teachers' delivery of instruction and student application were not. These results led to drastic changes to teacher preparation programs and an increase in professional development. The use of manipulative and technology in the classroom became an emerging topic as mathematics education began to focus on teaching pedagogy (Klein, 2003).

NCTM produced the Professional Standards for Teaching Mathematics in 1991. It illustrated the fundamentals of teaching effectively (National Council of Teachers of Mathematics, 2000).

The Assessment Standards for School mathematics was created in 1995, followed by Principles and Standards for School Mathematics (PSSM) in 2000. The PSSM were developed by the Standards 2000 Writing Group, which included teachers, mathematicians, researchers and administrators (Ferrini-Mundy, 2000). The group met for two or three weeks for during the summers of 1997-1999, and was charged with building upon prior standards for four grade bands: pre-kindergarten through 2nd grade, 3rd -5th grade, 6th -8th grade and 9th-12th grade (Ferrini-Mundy, 2000). PSSM consists of two major parts, principles, and standards. The principles address the following six predominant themes: equity, curriculum, teaching, learning, assessment, and technology.

Equity involves having high expectations and supporting all students. This was to ensure all students received a fair education. The curriculum must include more than just specified activities, but should concentrate on important mathematics functions, which must be communicated across all grade levels. Effectively teaching mathematics involves a deep understanding of students' prior knowledge, challenges, and weaknesses. It also includes teachers having high expectations for all students. Active learning involves students building new knowledge, not from only experience, but prior knowledge as well. Assessments should produce data to drive instruction and encourage the learning of important math concepts. This information is useful to student and teachers. Technology enhances student learning by making the mathematics concept taught more engaging (National Council of Teachers of Mathematics, 2000).

Following these principles, the standards for school mathematics describe comprehensive goals for mathematics instruction. NCTM (2000) created five content and process standards for mathematics education. The five content standards give a detailed explanation of the strands of

content that students should learn, while, the process standards illustrate the ways of obtaining and apply the concepts. These standards describe the mathematical understanding, knowledge, and skills that students should obtain from pre-kindergarten through grade 12. The five content standards are as follows: (a) number sense and operations, (b) algebra, (c) geometry, (d) measurements, and (e) data analysis and probability. The content standards have specified expectations for each grade band. The following expectations, in the table below, support middle school mathematics, grades sixth through eighth.

Number Sense and Operations	Algebra	Geometry	Measurement	Data Analysis & Probability
Work flexibly with fractions, decimals, and percents to solve problems.	Represent, analyze, and generalize a variety of patterns with tables, graphs, words, and, when possible, symbolic rules.	Precisely describe, classify, and understand relationships among types of two- and three-dimensional objects using their defining properties;	Understand both metric and customary systems of measurement;	Formulate questions, design studies, and collect data about a characteristic shared by two populations or different characteristics within one population;
Compare and order fractions, decimals, and percents efficiently and find their approximate locations on a number line.	Relate and compare different forms of representation for a relationship.	Understand relationships among the angles, side lengths, perimeters, areas, and volumes of similar objects;	Understand relationships among units and convert from one unit to another within the same system;	Select, create, and use appropriate graphical representations of data, including histograms, box plots, and scatterplots.
Develop meaning for percents greater than 100 and less than 1.		Create and critique inductive and deductive arguments concerning geometric ideas and relationships, such as congruence, similarity, and the Pythagorean relationship.	Understand, select, and use units of appropriate size and type to measure angles, perimeter, area, surface area, and volume.	
Understand and use ratios and proportions to represent quantitative relationships.				
Develop an understanding of				

Figure 3. K-12 Content Standards.

large numbers and recognize and appropriately use exponential, scientific, and calculator notation.				
Use factors, multiples, prime factorization, and relatively prime numbers to solve problems.				
Develop meaning for integers and represent and compare quantities with them.				

Figure 3. K-12 Content Standards (continued).

In the opinion of NCTM (2000), the process standards "highlight the mathematical processes that students draw on to acquire and use their [mathematical] content knowledge." The process standards are goals for student learning, which includes activities, traditional behaviors and processes through which math is learned (Bosse', Lee, Swinson, & Faulconer, 2010). The standards are encapsulated in the five following areas: (a) Problem Solving, (b) Reasoning and Proof, (c) Communication, (d) Connections, and (e) Representation. The characteristics of each of the process standards are well articulated in the Principles and Standards for School Mathematics.

Problem-solving is defined as "engaging in a task for which the solution method is not known in advance" (NCTM, 2000, p. 52). Problem solving involves students building their mathematical knowledge and using multiple strategies to create solutions to math problems, with hopes of them developing new understandings. According to the explanation, using only math procedures taught is not engaging in problem solving. The second process standard is Reasoning and Proof (Groth, 2013). Although it encompasses student's being able to formulate math proofs

by graduation, it also involves students having the ability to explain how they produced the answer to a mathematical problem. Teachers are charged with helping students' use mathematical reasoning to answer open-ended questions.

Communication is the third process standard. This process involves students having a verbal conversation that allows them to express their mathematical thinking. Peer-to-peer communication is vital as it affords students the opportunity to "analyze and evaluate the mathematical thinking and strategies of others" (NCTM, 2000, p. 60).

Connections are the fourth process standard. Students should be able to connect the different learned mathematical concepts and not see them as separate entities (Bosse' et al.., 2010). For example, student should understand how fractions, decimals and percents are all connected. Teachers should be sure to ask questions that allow the students to see how the concepts are directly related (Groth, 2013). This process standard also involves students not only making connections between math concepts, but also relating mathematics to contexts outside of the classroom, for instance, being able to use data probability and statistics to predict the weather for next week.

Representation is the last and newest process. Representations are used to model and communicate mathematical ideas and may be interpreted and viewed differently by individual students (Bosse' et al.., 2010). An example of a mathematical representation is the place value system used to represent numbers. Technology can aid in students discovering other conventional representations, such as, the graphing calculator, which allows you to produce different types of graphs for a specific function (Groth, 2013).

The National Science Foundation was responsible for effectively implementing the NCTM standards nationwide. After the 1989 Education Summit, the Education and Human

Resources (EHR) division of the NSF set out to transform how teachers taught math and science (Klein, 2003). The EHR created a sequence of Systemic Initiative grants that would aid in encouraging essential changes in science and mathematics education in America (D. Klein, 2003).

History of Rural Education

Conventionally, rural education has been directly aligned with local community values and ways of life (Theobald & Nachtigal, 1995). Potter (1987, as cited in Bard, Gardner, & Wieland, 2006) suggests that in the mid-1800s schools were consolidated by eliminating the smaller ones and favoring the larger one in effort to improve student learning. Schools of larger size were seen as more efficient and economical.

Due to this type of rational, urban and larger schools were accepted as the "one best model" and as result of this thinking, rural schools were deemed deficient (Bard, Gardner, & Wieland, 2006). Contant (1959) affirmed that in order to prepare students for higher education, a high schools graduation class should be 100 students or more. Contant also believed that the eradication of small high schools would yield greater curricular offerings and increase cost-effectiveness (Contant, 1959).

Both Sputnik and the Cold War created elevated concerns that small high schools, most of which were rural, were not developing the kind of human capital needed to promote national security (Ravitch, 1983). Educational leaders continued to flaunt large schools as the best way to educate the nation's young people efficiently and effectively, and deemed that professionals knew more about educating children. Experts neglected to include members of the local community in any decisions (Bard et al., 2006). Scholars considered parents and educators in rural communities as being backwards for not educating students as "human capital", and not

informed enough to know what was best for education.

Rural economic downfall forced people to migrate to urban areas for work. As a result, student enrollment decreased and costs increased, which caused financial crises for many rural areas (Bard et al.., 2006). Cubberly (1914) declared that:

> The rural school is today in a state of arrested development, burdened by education traditions, lacking in effective supervision, controlled largely by rural people, who, too often, do not realize either their own needs or the possibilities of rural education (Cubberly, 1914).

Theoboald & Nachtigal (1995) suggests that rural school stakeholders had stripped the schools' of their economic and political power, and that a mass exodus to a larger region would not be the solution to the problem. Healthy urban and rural communities needed each other in order to exist, and more cooperation and less competition were necessary. The transformation of the education system during this era shifted from a local concern to that of the state and nation (Theobald & Nachtigal, 1995). The role of the rural schools is not to mirror its urban and suburban counterparts, but to adhere to its own identity.

Boyer (2006) affirmed that with much encouragement from the U.S. Department of Education, states have created academic benchmarks to hold schools accountable to educate all students effectively. However, there is a plethora of regions in the nation where schools are failing to meet national and state mandates, such as rural America (Boyer, 2006).

The National Science Foundation's Rural Systemic Initiative program was created to support systemic reform and activities that would aid in improving mathematics and science education in rural school districts and economically disadvantaged regions (The National Science Foundation, 2015). In these rural areas, the achievement gap was wide and past

education reforms had an insignificant amount of impact on student achievement. Students who attended schools in these regions were exposed to mediocre math and science classes and the number of highly qualified teachers and resources were fewer than their urban counterparts (Boyer, 2006).

The Alaska Rural Systemic Initiative (AKRSI) is a product and model of the National Science Foundation's Rural Systemic Initiative**.** The AKRSI in cooperation with the University of Alaska began in 1994 and was funded by the National Science Foundation (Barnhardt, 2005). The project created broad range of programs to support the community and improve student achievement; however, AKRSI, recognized that math and science education must mirror and enhance the values of the Alaska Native culture (Boyer, 2006).

Education in Rural Schools

The location of a school is seen in two terms, rural (less city), and urban (more city). Multiple studies have been devoted to investigating the effect school location has on student achievement (Osokoya & Akuche, 2012). The National Assessment of Education Progress (NAEP) declares, the average 8th grade mathematics score has slightly increased over the last few decades however, 8th grade students in rural areas performed lower than their urban counterparts (National Center for Education Statistics, 2014).

According to Osokoya and Akuche (2012), multiple studies have been devoted to investigating the effect school location has on student achievement. A close link exists between educational attainment and the financial prosperity of the location of rural (non-metro) and urban (metro) schools (United States Department of Agriculture Economic Research Service, 2015).

The official Office of Management and Budget (OMB) metro and non-metro categories have been subdivided into three metro and six nonmetro categories. Each county in the U.S. is

assigned one of the 9 codes. This scheme allows researchers to break county data into finer residential groups, beyond metro and nonmetro. The Rural-Urban Continuum Codes were originally developed in 1974 (United States Department of Agriculture Economic Research Service, 2013).

Research suggests that an increasingly number of Americans living in rural (nonmetro) areas lag behind their urban (metro) counter parts in education achievement (United States Department of Agriculture Economic Research Service, 2015). Data obtained from The 2007 Trends in International Mathematics and Science Study revealed the location of the school yields the strongest link to mathematics achievement, whereas socio-economic status was the main predictor at the country level (Mohammadpour & Ghafar, 2014). The study conducted by Mohammadpour and Abdul Ghafar, included 217,728 students, within 7,216 secondary schools, in 48 countries, including the United States (Mohammadpour & Abdul Ghafar, 2014). Figure 4 depicts the classification scheme that distinguishes metropolitan counties by the population size of their metro area, and nonmetropolitan counties by degree of urbanization and adjacency to a metro area.

2013 Rural-Urban Continuum Codes

Code	Description
	Metro Counties:
1	Counties in metro areas of 1 million population or more
2	Counties in metro areas of 250,000 to 1 million population
3	Counties in metro areas of fewer than 250,000 population
	Nonmetro Counties:
4	Urban population of 20,000 or more, adjacent to a metro area
5	Urban population of 20,000 or more, not adjacent to a metro area
6	Urban population of 2,500 to 19,999, adjacent to a metro area
7	Urban population of 2,500 to 19,999, not adjacent to a metro area
8	Completely rural or less than 2,500 urban population, adjacent to a metro area
9	Completely rural or less than 2,500 urban population, not adjacent to a metro area

Figure 4. 2013 Rural-Urban Continuum Codes.

Multiple studies have analyzed the different types of homework strategies used by secondary students (Xu & Corno, 2006). However, those studies did not investigate how the use of homework management strategies related to school location and student academic performance (Xu, 2009). Xu (2009) conducted a study using 633 eighth grade students from both rural and urban schools. The results revealed that urban middle school students reported being more self-motivated to do their homework, then their rural middle school counterparts (Xu, 2009).

History of Mathematics Reform

Improving the teaching and learning of mathematics has been a goal of educators and reformers for decades. In a meta-analysis of the research on mathematical knowledge, teaching, and learning, Ball, Lubienski, and Mewbom (2001) wrote that several efforts to improve and reform mathematics have occurred over the past 40 years, but that change has been difficult (Ball, Lubienski, & Mewborn, 2001). As a reaction to the Agenda in Action, in 1986, the Board of Directors of the National Council of Teachers of Mathematics (NCTM) created the Commission of Standards for School Mathematics to help aid in the improvement of the quality of school mathematics (NCTM, 1989).

The Commission established a framework, the Curriculum and Evaluation Standards for School Mathematics (NCTM, 1989), to guide the reformation of school mathematics. This document, in addition to the Professional Teaching Standards (NCTM, 1991) and the Assessments Standards for Teaching Mathematics (NCTM, 1995), created a vision of school mathematics curriculum and teaching and a view of evaluation. The information included in these three documents differed from what most teachers experienced in their mathematical education and what they found in majority of textbooks. As the mathematics curriculum begins

to evolve, there will be a dire need to more prepared and knowledgeable teachers (Manoucheri, 1997).

During that era, the current mathematical learning practice focused on drills and practice of foundational skills, along with the manipulation of mathematical symbols and fictional word problems that allowed students to utilize skills taught to create solutions (Price & Ball, 1997). However, Price & Ball (1997) stated that reformers envisioned teachers more as facilitators and students being more engaged in the learning process. There is not one specific cause that has led to the failures of past mathematical reform efforts. These efforts set out to change the teaching and learning of mathematics in the United States. Nevertheless, the repetition of traditional mathematics methods still dominated inside the classroom (Ball et al., 2001).

The National Science Foundation continued to support and advocate for the NCTM Standards and during the 1990's funded new mathematics programs aligned with the NCTM math standards for kindergarten through 12th grade (Klein, 2003). The K-12 Mathematics Curriculum Center was an organization created and funded by the NSF. The mission of the organization was "to support school districts as they build an effective mathematics education program using curriculum materials developed in response to the National Council of Teachers of Mathematics' *Curriculum and Evaluation Standards for School Mathematics*."

Even though, the United States K-12 education system was a multi-billion dollar operation, the Education and Human Resource Division of the NSF faced a challenge. The funding needed to transform the schools NSF sought to reform, exceeded the allocated budget given by the government. Yet, with the support of private entities and individual state support, The Systemic Initiatives was successful in implementing NCTM standards and aligned curriculum, which supported the reform of the selected schools (Boyer, 2006).

Although education leaders made continuous efforts to reform the education system, math discrepancies between the U.S. and other countries remained extensive **(**National Center for Education Statistics, 2013). According to the 2012 Program for International Student Assessment (PISA), American students ranked 36th out of the 65 countries tested in mathematics extensive **(**National Center for Education Statistics, 2013). When compared to students in other industrialized countries, fifteen-year olds tested average in science and reading, and below average in math (Hanushek, Peterson, & Woessmann, 2014). The National Assessment of Educational Progress (NAEP) reports that only 35% of the U.S. class of 2015 reaches or exceeds proficiency levels in mathematics (Hanushek et al., 2014).

As a result, the United States Science, Technology, Engineering and Mathematics (STEM) initiative was created with hopes of increasing academic awareness and performance in these areas (Hanushek et al.., 2014). However, the Third International Mathematics and Science Study (TIMSS) revealed that American students lack the necessary math skills to be globally competitive and that one of the major factors directly related to that poor performance is the absence of a coherent and rigorous math curriculum (Schmidt et al., 2007). Since 1973, the NAEP was the only way the United States assessed students' mathematics achievement using a common tool and it assessed students across the country, however, the math standards varied from state to state (Hughes, Daro, Holtzman, & Middleton, 2013). Since the NAEP Mathematics Framework is a structure of assessment not curriculum, in 2010, the Common Core State Standards (CCSS) for English language arts and mathematics were released (Hughes et al.., 2013). The CCSS is a state-led initiative created by a collaboration of teachers, administrators, and education experts in hopes of developing a more consistent and challenging framework, which will aid in increasing student achievement (Hughes et al., 2013). As depicted in Figure 4,

Common Core Math Standards Framework, the CCSS covers the following eight mathematical practices (Common Core State Standards Initiative, 2015):

- CCSS.MATH.PRACTICE.MP1 Make sense of problems and persevere in solving them.
- CCSS.MATH.PRACTICE.MP2 Reason abstractly and quantitatively.
- CCSS.MATH.PRACTICE.MP3 Construct viable arguments and critique the reasoning of others.
- CCSS.MATH.PRACTICE.MP4 Model with mathematics.
- CCSS.MATH.PRACTICE.MP5 Use appropriate tools strategically.
- CCSS.MATH.PRACTICE.MP6 Attend to precision.
- CCSS.MATH.PRACTICE.MP7 Look for and make use of structure.
- CCSS.MATH.PRACTICE.MP8 Look for and express regularity in repeated reasoning.

These mathematical practices provide math educators with a clear framework used to develop high levels of proficiency in all students. The Common Core Standards State Initiative website affirms that Forty-two states, the District of Columbia, the Department of Defense Education Activity, Guam, U.S. Virgin Islands, American Samoan Islands, and the Northern Mariana Islands have adopted the common core standards. However, the following state and territories have opted out: South Carolina, Texas, Alaska, Virginia, Indiana, Minnesota, Nebraska, Oklahoma, Alaska and Puerto Rico.

CCSS.MATH.PRACTICE.MP1 Students should be able to find an accurate solution, explain, and rationalize the solution. Also, check the solution using other approaches to understand the problem.	**CCSS.MATH.PRACTICE.MP2** To reason abstractly and quantitatively the student must be able connect prior knowledge, understand relationships, and represent a mathematical situation symbolically and solve problems.
CCSS.MATH.PRACTICE.MP3 Understand current definitions and arguments, make conjectures and use common examples. Communicate to others and distinguish when reasoning is flawed. Ask useful questions to clarify arguments.	**CCSS.MATH.PRACTICE.MP4** Mathematically proficient students will apply math to real-world situations by identifying important quantities, then interpreting, analyzing, drawing conclusions, and revising their conclusions if necessary.
CCSS.MATH.PRACTICE.MP5 Students use the appropriate equipment including various technologies to solve a problem. Sound decisions are made while analyzing data. Results are visualized and predictions made.	**CCSS.MATH.PRACTICE.MP6** Students will accurate, efficient, and precise in their calculations, graphical representation, and communication when solving problems and facilitating discussion of the solutions with others.
CCSS.MATH.PRACTICE.MP7 All students will be able to identify, create, and evaluate patterns related to algebraic expressions using the distributive property and construction of simple geometric figures.	**CCSS.MATH.PRACTICE.MP8** Mathematically proficient students notice if calculations are repeated, and look for both general methods and shortcuts. They continually evaluate the reasonableness of their results.

Figure 5. Common Core Math Standards Framework.

Since education and policy matters have intersected, mathematics education has received more scrutiny than any of the other academic disciplines have received (Drake, Noyes, & Wake, 2013). Before this occurrence, the two entities would rarely focus on any matters related to each other. Consequently, the division of research pertaining to the evolution of mathematics education and policy studies has led to a minimal amount of information combining the two (Drake et al., 2013).

National Council of Teachers of Mathematics

The National Council of Teachers of Mathematics (NCTM)'s effort to improve math education began with the release of Curriculum and Evaluation Standards for School Mathematics in 1989 (National Council of Teachers of Mathematics, 1980). Because it was the first time a professional organization established goals for teachers and policymakers in a school

discipline, the document is a historically significant step to provide focus, coherence, and new ideas to math education (National Council of Teachers of Mathematics, 1991). In 1991, NCTM published Professional Standards for Teaching Mathematics, which described the elements of effective mathematics teaching. In 1995, NCTM issued Assessment Standards for School Mathematic, which sets objectives against which assessment practices can be measured (National Council of Teachers of Mathematics, 1995).

Based on these three standards, NCTM launched the "Standards 2000 Project" in 1997. The aim of the project was to update the standards document while periodically examining, evaluating, and revising these standards to keep them relevant. A draft version of the new document was finished in 1998, and NCTM substantially revised the document based on feedback from many different sources responding to the draft. The resulting publication was Principles and Standards for School Mathematics, which appeared in 2000. Education professionals considered it to be a guideline to help realize visions of high-quality mathematics education (Bredekamp, 2004).

The distinctive characteristic of Principles and Standards for School Mathematics is that, including pre-kindergarteners for the first time, it acknowledges the importance of mathematics education in the early years. Principles and Standards for School Mathematics consist of two major parts. The first, the principles for school mathematics, deals with the broad issues of equity, curriculum, teaching, learning, assessment, and technology (National Council of Teachers of Mathematics, 2000). The first principle asserts that excellence in mathematics education requires equity, that is, the need to have high expectations and to provide strong support for all students. According to the second principle, a curriculum must be more than a collection of activities. In other words, it should be coherent, focused on important mathematic

concepts, and articulated well across the grade levels (Bredekamp, 2004). The third principle, teaching, insists that mathematics teaching requires an understanding of what students know (prior knowledge) and what they need to know (new knowledge) and then challenging and supporting them to learn it well. The fourth principle emphasizes the importance of learning mathematics by building new knowledge from prior experience and knowledge. The fifth principle emphasizes the appropriate usage of assessment, which not only supports mathematical learning but also provides useful information to both teachers and students. The last principle notes that technology can be a helpful tool to enhance good teaching and students' learning.

Following these principles, the standards for school mathematics describe comprehensive goals for mathematics instruction. NCTM produced five content standards and five process standards for mathematics education. These standards describe the mathematical understanding, knowledge, and skills that students should acquire from pre-kindergarten through grade 12. Depicted in great detail, the standards are organized in four grade-band chapters; pre-kindergarten through grade 2, grades 3-5, grades 6-8, and grades 9-12. The five strands of the content standards are number sense and operations, algebra, geometry, measurements, and data analysis and probability (National Council of Teachers of Mathematics, 2000)

For each of the five content standards, a set of expectations specific to each grade-band is included. Number sense and operations consist of counting, comparing, ordering, grouping, and adding to and taking away a quantity. The emphasis of algebraic thinking in early childhood involves finding patterns. Patterns are a way for children to recognize order and to organize their environment (National Council of Teachers of Mathematics, 2000). "Geometry can be used to understand and to present objects, directions, and locations in our world, and the relationship between them" (Clements, 2004). The subtopics of geometry include shape, location direction

and coordinates, visualization and spatial reasoning, and transformations and symmetry. Measurement, one of the most widely used applications, determines how much of an attribute an object possesses, such as length, weight, and capacity. Measuring involves the use of tools such as rulers, and includes nonstandard ways of measuring, such as paper clips. Data analysis uses information to classify, organize, and answer questions.

The content standards are connected by process standards that are related to all content areas. The five strands of the process are problem solving, connections, reasoning, representation, and communication (National Council of Teachers of Mathematics, 2000). For each of the five process standards, the examples demonstrate what the standard should look like in each grade-band and what the teacher's role should be to achieve the standards. All of the standards apply to all grade-bands, but each grade-band put a relatively different emphasis on the particular standards.

Although NCTM has provided standards to help guide the mathematic curriculum, states are providing inconsistent mathematical programs resulting in a math curriculum that is "a mile wide and an inch deep" (Schmidt, McKnight, & Raizen, 1997, p. 2, as cited in NCTM, 2006, p. 3). In order to assist teachers in identifying the most critical content when implementing the standards, NCTM issued a document called Curriculum Focal Points in 2006. The document established which mathematical topics are imperative to cover in pre-kindergarten through grade eight. Curriculum Focal Points enumerates the primary mathematical concepts for each grade level. The document asserted that education professionals should address focal points in context, and should emphasize process standards (National Council of Teachers of Mathematics, 2006).

Supplementary Frameworks of Mathematics Education

The following frameworks play important roles in academic achievement with an emphasis on mathematics education. The Culturally Responsive Teaching Theory (CRTT) depicted in Figure 3: A Culturally Responsive Teaching Model, is a pedagogy that recognizes how vital it is to include students' cultural background and references in every aspect of teaching and learning (Ladson-Bilings, 1994). In the 1970s and 1980s, a group of scholars created the cultural difference model in an effort to eliminate the culture deficit paradigm. Second-generation cultural difference scholars, such as Ladson-Billings (1994), created the culturally responsive teaching theory as guidance for educators looking to increase academic achievement amongst students from diverse racial, ethnic, and cultural backgrounds (Gay, 2010). The theory suggests that there is discontinuity between the school and home cultures of low-income students that negatively effects their academic achievement (Gay, 2010).

Classrooms of the 21st century contain more students from diverse backgrounds. To meet the needs of all students varying in culture and abilities, teachers must employ culturally responsive pedagogy (Richards, Brown, & Forde, 2006). Culturally responsive classrooms include effective teaching and learning that is culturally supportive, and identifies and nurtures students' strengths (Richards et al., 2006). Culturally responsive pedagogy acknowledges, respects, and understands differences and the complexities that come with it. It is encompasses three dimensions: institutional, personal and instructional (*Culturally responsive pedagogy: Towards equity and inclusivity in Ontario schools*, 2013).

Little (as cited in Lynch 2011) states that the institutional dimension of culturally responsive pedagogy mirrors the policies and values of the administration. It stresses the need to transform the cultural factors affecting organization of schools. As is seen in Figure 5, the

personal dimension reflects the mentality of the educator and the process of becoming more culturally aware and responsive to the needs of the students (Richards et al., 2006). By having a profound knowledge of their students, culturally responsive teachers understand how they learn best (*Culturally responsive pedagogy: Towards equity and inclusivity in Ontario schools*, 2013). The instructional dimension encompasses the strategies and teaching practices involved in implementing culturally responsiveness in the classroom (Lynch, 2011). All three dimensions are vital to the successful creation of a culturally responsive learning institution (Richards et al.., 2006).

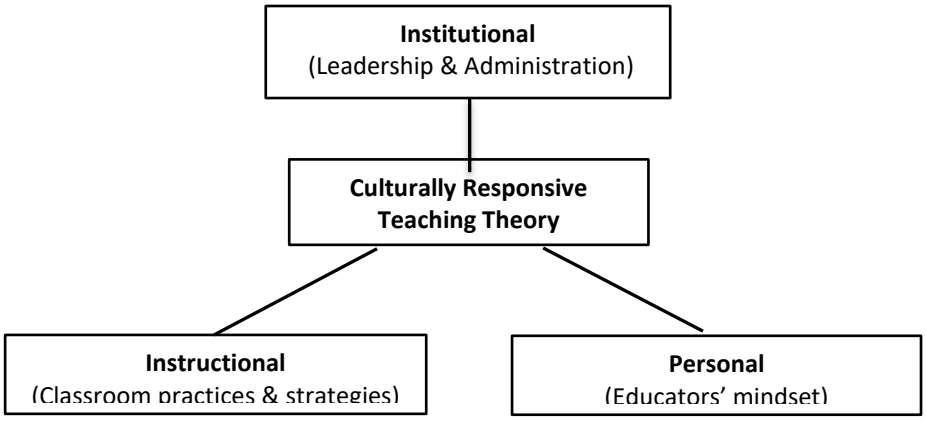

Figure 6. A Culturally Responsive Teaching Model.

Treffers further reflected on Freudenthal's idea of mathematization (Menon, 2013). In 1976, he first created the notion of two types of mathematization – horizontal and vertical (Treffers, as cited in Van den Heuvel-Panhuizen, 1998; Menono, 2013). Horizontal mathematization involves students inventing the mathematical tools needed to find the solution to a problem situated in real-life context. During the horizontal stage, students use their informal skills to explain and solve a contextual problem. This stage's artifacts include inscriptions,

symbols and procedures (Johnson, 2013). Vertical mathematization is the act of restructuring parts of the mathematical system, for example, finding and applying shortcuts and connections amongst concepts and strategies (Van den Heuvel-Panhuizen, 1998). Then, the vertical stage occurs when the students' informal skills leads them to solving the problem using mathematical jargon or to find the answer using an algorithm (Barnes, 2005).

Gravemeijer (2004) affirmed that an instruction design supporting instruction was needed to effectively reform mathematics education. The design should aid students in heightening their present ways of thinking into more refined ways of mathematical reasoning (Gravemeijer, 2004). As a result, Gravemeijer introduced the concept of The Local Instruction Theory (LIT) and described it as "the description of, and rationale for, the envisioned learning route as it relates to a set of instructional activities for a specific topic" (p. 107).

The LIT derives from the Theory of Realistic Mathematics Education, as RME provides the instructional framework needed to create a local instruction theory (Gravemeijer, 2014). A LIT aids teachers by offering a framework that supports the students' mathematical development of a specific concept (Nickerson & Whitacre, 2010). The LIT should include instructional activities, anticipated learning guides, and a description of the learning goals (Nickerson & Whitacre, 2010). The theory adapts to the students' feedback and assessments of what they actually comprehended (Gravemeijer, 2004).

Other Factors Influencing Performance in Mathematics Education

Other factors influence parental involvement and student achievement in learning mathematics. Of primary interest for this study is, gender, socio-economic status, school setting, and ethnic group.

Gender. In 1972, Title IX prohibited public schools from having single-gender

classrooms; however, in 2001, the NCLB prompted an amendment that allowed federal grants to fund research in public schools on single-gender programs (Friend, 2007). Subsequently, single-gender classrooms and schools have increased tremendously. However, some research suggests that single-gender education has a positive effect on student achievement, while other studies report that same-gender classrooms have no effect (Friend, 2007).

After a meta-analysis of 1500 cross-cultural studies, Maccoby and Jaklin (1974, as cited in Bezzina, 2010) affirmed that after age 11, gender disparities in mathematics begin to develop. Female students began to acquire superb verbal skills, while male students' mathematics, and visual-spatial skills become more enhanced (Bezzina, 2010). For years, educational leaders attemptednmany efforts have been made to decrease the gender gap in mathematics test scores. Despite the efforts, results revealed mathematics test scores have varied in the United States (Tsui, 2007).

Between 1990 and 2003, five national and international surveys of fourth, eighth and twelfth graders indicated that males and females math scores were similar. However, around the same time, male eleventh and twelfth graders were scoring higher in mathematics on the Scholastic Aptitude Test (SAT), then their female counterparts (Tsui, 2007). From a meta-analysis, Hyde (1996 as cited in Bezzina, 2010) determined that the gender differences in mathematics performance significantly decreased between 1974 and 1996. In 2006, Goldin, Katz, and Kuziemko affirmed that girls in high school were outperforming males in most academic core classes, specifically those that assessed verbal intelligence (as cited in Niederle & Vesterlund, 2010). Nonetheless, the gender discrepancy in mathematics has altered. Niederle and Vesterlund (2010) affirms that more female students are enrolling upper level math and science courses and the mean and standard deviations of males' math test scores are only faintly

greater than their female counterparts.

Mathematically gifted male students have constantly scored significantly higher than gifted females. Between 1972 and 1991, data collected from the Study of Mathematically Precocious Youth (SMPY) illustrated that amongst the students between the age of 12 and 13 who scored 700 or above on the math segment of the SAT, there was one female for every 13 boys (as cited in Tsui, 2007). Gender differences in mathematics performance in America are currently declining (Else-Quest & Hyde, 2010).

Socioeconomic Status. Socioeconomic status is measured by the income or earning of students' parents and plays an important role in student academic achievement (Shah, Atta, Qureshi, & Shah, 2012). Beginning children research did not include the socioeconomic status of parents and was not recognized as an influencing factor until the 1930's by behavioral scientists (Shah et al., 2012). Eamon (2005) suggests that students with low SES usually perform poorly academically due to limited access to vital resources.

A myriad of studies have sought to clarify the association between socioeconomic status and academic performance (Lam, 2014) Students with low socioeconomic (Richland One School District Assessment Data) status usually perform poorly academically due to limited access to vital resources (Eamon, 2005). Research relating to both SES and student's mathematics achievement has received a significant amount of attention (Kalaycıoğlu, 2015). In 2014, Kalaycıoğlu conducted a study that explored the relationship between variables such as, socioeconomic status. The sample group used consisted of 8, 806 students from various countries, including the USA, who participated in the Programme for International Student Assessment 2012 (Kalaycıoğlu, 2015). The results indicated that SES does have a substantial impact on mathematics achievement.

Tynkkynen, Vuori, and Salmela-Aro conducted a study that examined the extent to which parents' socioeconomic status and psychological control influenced their students' grade point average. One thousand and thirty-four students, aged 15 to 16, and their parents, which included 720 mothers and 542 fathers, completed a survey. The results indicated that the lower the parents' SES, along with a high level of psychological control, the lower was their child's grade point average (Tynkkynen, Vuori, & Salmela-Aro, 2012).

Bae and Wickrama (2015) conducted a study in Korea that sought to examine how ones family socioeconomic status may affect a student's academic achievement. Four hundred and forty-one twelve to fourteen-year old students participated in the study. The results revealed both a direct and indirect relationship between families' socioeconomic status and academic achievement (Bae & Wickrama, 2015). Due to the educational context of the Korean culture, this case was unique and differed from the findings in Western countries, such as the United States (Bae & Wickrama, 2015).

Ethnic Group. In the United States, there is a huge racial and ethnic disparity in academic achievement. Historically, African Americans and Latinos score significantly lower than their white counterparts (Sonnenschein & Galindo, 2015). In 2007, The National Assessment of Educational Progress assessments showed an increase in mathematics scores for both African-Americans and Caucasians (Vanneman, Hamilton, Anderson, & Rahman, 2009). African-American students, however, still scored significantly lower than Caucasian students (Vanneman et al.., 2009). Current research, such as this study, focuses only on two ethnicities, and does not categorize data by geographical location.

Education research reveals a pattern in racial and ethnic disparities in academic achievement, in which African American, American Indian, Latinos, Southeast Asian groups

perform significantly lower than their Caucasian and Asian American counterparts perform (American Psychological Association Presidential Task Force on Educational Disparities, 2012). In 2009, Neblett, Chavous, Nguyen, & Sellers conducted a study to analyze the relationship between racial socialization, racial discrimination, and academic achievement in African American boys (Neblett, Chavous, Nguyen, & Sellers, 2009). The sample included 144 adolescents. The results illustrated that racial discrimination was directly related to low academic achievement among the young men (Neblett et al.., 2009).

In 2009, Muller, Riegle-Crumb, Schiller, Wilkinson, and Frank conducted a study see whether America's racially diverse high schools offer the same educational opportunities to students of different racial and ethnic groups (Muller, Riegle-Crumb, Schiller, Wilkinson, & Frank, 2010). The quantitative analysis assessed how high schools vary in the extent to which sophomore math classes enroll underrepresented minority students in advanced math classes. Two samples constituted the data of racially diverse high schools. The first sample was from 26 high schools with 3,149 students and a racial makeup of Africa Americans, Caucasians, and Asians. The second sample was from 22 high schools with 2, 775 students with a racial makeup of Latinos, Caucasians and Asians (Muller et al., 2010). The results revealed that the patterns of racial inequality in schools demonstrated a link to minority students having lower grades by senior year.

In 2008, Brown-Jeffy used the High School Effectiveness Study data to investigate the relationship between school demographics and the race-based gap in mathematics achievement (Brown-Jeffy, 2009). The sample included 3,392 students from 177 schools. The study revealed that schools with a racial composition of at least 50% African Americans or Hispanic, all student achievement is lower, including Caucasians (Brown-Jeffy, 2009).

Theoretical Connections to the Study

Three theories encompassed the foundation of this investigation. Epstein's School-Family-Community Partnership Model is an influential model in parental involvement research (Hernandez, 2011). However, for this study, an extension of the model, Epstein's School-Family-Community Partnership in the Middle Grades will be the overarching framework strengthened by Brofenbrenner's Biocological Model of Human Development and Freudenthal's theory of Realistic Mathematics Education.

Epstein (2001) of the Johns Hopkins University's Center on School, Family, and Community Partnerships, one of the nation's leading experts on parent involvement, has divided school-parent involvement programs into the six broad categories of parenting, communicating, volunteering, learning-at-home, decision-making, and community collaboration. Given the deliberate classification of parental involvement as intentional acts of engagement (Jeynes, 2010), Epstein's categorization of involvement forges the foundation essential to each component of an effective engagement model.

The parenting component elaborates on schools assisting families with parenting skills through providing information on children's developmental stages and advice on learning-friendly home environments. Examples of this assistance includes, establishing consistent times for homework and positive educational habits. Understanding parental involvement as a positive influence on academic achievement helps to motivate school staff to assist parent and parents to assist children (El Nokali, Bachman, & Votruba-Drazl, 2010). In addition, providing materials for projects and engaging in conversation on daily educational events are also essential to the parenting component of involvement.

Communicating is the next component of involvement by working to educate families

about their child's progress, school services, and providing opportunities for parents to communicate with the school. Involvement includes establishing a two-way communication pathway, maintaining high expectations of one's children, communicating with both children and school staff, and parental style (Jeynes, 2005b; Jeynes 2007). While there are many forms of engagement, stakeholders can strengthen the connection between school and home through continuous and established forms of communication.

Volunteering is another essential component of parental involvement in the education process. Parental involvement is evident in high achieving student groups (Planty, 2009). Planty et al. (2009) reported that in 2007, about 89% of parents attended a general school or PTA or PTO meeting, 46% volunteered/served on a school committee 65% participated in school led fundraising activities, and 78% attended parent-teacher conferences. However, it is important to identify that these activities do not represent the whole concept of parental involvement through a volunteering lens. Other activities include finding ways to recruit and train them to work in the school or classroom.

When schools help families with curriculum-based activities at home, the schools promote learning at home through decision-making and planning for student success (Hernandez, 2011). Examples of this work at the middles school level include schools and educators sharing ideas on strategies to assist parents in monitoring and helping with homework. In addition, involvement in summer learning activities and developing parents' skills in varying subject matter by grade level is also an effective strategy.

Decision-making in schools involves developing parents as leaders and representative in the school community. Including parents in the decision-making process, in which schools include families as partners in school organizations, advisory panels, and similar committees,

certainly promotes involvement (Hernandez, 2011). Involving parents in policy development, helping them to understand student rights, and working to establish families in the ownership of the outcomes of the school community helps to establish that foundation of shared decision-making.

Finally, community collaboration, a two-way outreach strategy in which community or business groups are involved in education and schools encourage family participation in the community, is essential to parental involvement. Recognizing community as the environment that influence student learning certainly involves home, and therefore parental involvement is critical to community collaboration (Epstein, 2005). Through parental involvement, the ultimate goals of matching community contributions to school goals, and integrating child and family services with education have a greater chance of being achieved. Organic community collaboration is the result of the assurances for equity of opportunities for students and families to participate in community programs or to obtain services. While there are many arms of engagement in the educational environment, the six broad categories of parenting, communicating, volunteering, learning-at-home, decision-making, and community collaboration make parent involvement a holistic model for promoting student achievement (Hernandez, 2011).

Epstein's School-Family-Community Partnership in the Middle Grades is a collaboration of Epstein's School-Family-Community Partnership Model and the National Middle School Association's (NMSA) position paper, *This We Believe: Keys to Educating Young Adolescents*. *This We Believe* provides a framework for anyone responsible for creating programs geared towards improving learning for adolescent learners (National Middle School Association, 2010). To guide and support students in their quest to achieve these goals, NMSA avows that an

education for middle school students must include four attributes. The first attribute, developmentally responsive, involves using the distinctive nature of young adolescents as the foundation upon which all decisions about school organization, policies, curriculum, instruction, and assessment are made. Challenging is the second attribute. It ensures that every student learns and holds every member of the learning community to high expectations. The next attribute is Empowering, which includes providing all students with the knowledge and skills they need to take responsibility for their lives, to address life's challenges, to function successfully at all levels of society, and to be creators of knowledge. The last attribute is equitable, and it involves advocating for and ensuring every student's right to learn, and provides appropriately challenging and relevant learning opportunities for every student. The following 16 characteristics found in the image below illustrate these four attributes (National Middle School Association, 2010).

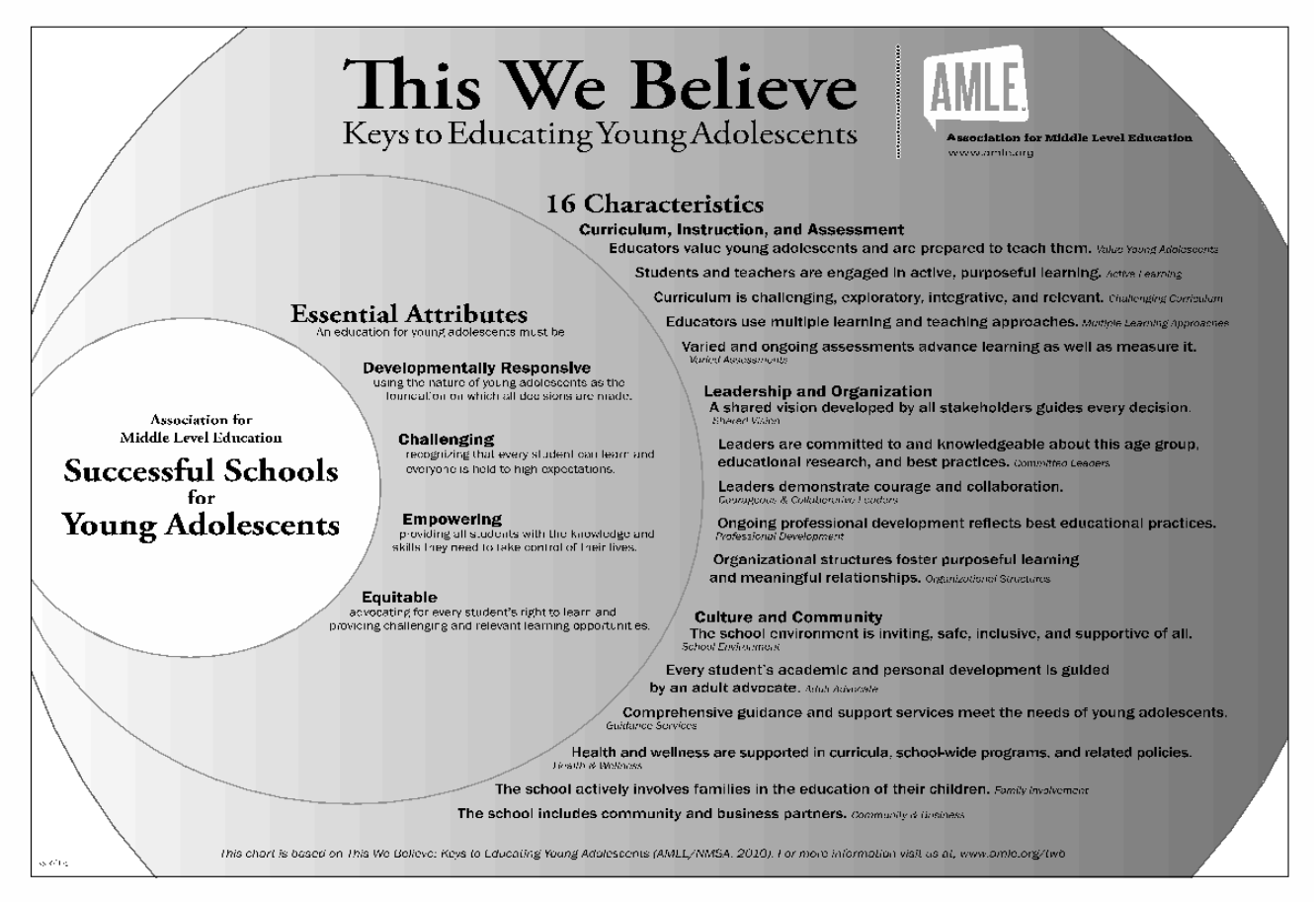

Figure 7. This We Believe, 16 Characteristics.

Brofenbrenner's Bioecological Model of Human Development looks at child's development within the context of the system of relationships that form their environment (Krishnan, 2010). The theory defines complex layers of environment that has an effect on a child's development and that a child's own biology fuels their development. The collaboration of the child's maturing biology and his immediate family (parents) environment steers their development (Krishnan, 2010). The four complex layers are the microsystem, mesosystem, exosystem, and the macrosystem (Brofenbrenner & Morris, 2006). The microsystem is the layer closest to the child and contains the structures with which the child has direct contact. The microsystem encompasses the relationships and interactions a child has with his or her

immediate surroundings such as family, school, neighborhood, or childcare environments.

Mesosystems connect two or more systems in which children, parents, and families live. They provide the connection between the structures of the child's microsystem. For example, the connection between the child's teacher and his parents, between his church and his neighborhood, each represent mesosystems (Brofenbrenner & Morris, 2006).

The exosystem defines the larger social system in which the child does not directly function (Krishnan, 2010). The structures in this layer affect the child's development by interacting with some structure in his/her microsystem. Parent workplace schedules or community-based family resources are examples.

The macrosystem is composed of cultural values, customs, and laws. It refers to the overall patterns of ideology and organization that characterize a given society or social group. Macrosystems describe the cultural or social context of various societal groups, such as social classes, ethnic groups, or religious affiliates (Krishnan, 2010). This is the outermost layer in the child's environment.

Freudenthal's theory of Realistic Mathematics Education (RME) suggests that in order to be of human value, mathematics must be linked directly to reality, connected to children and relevant to society (Van den Heuvel-Panhuizen, 1998). Connecting to reality does not mean that the student will encounter such situations in their everyday life, but they need to be able to understand the context of the problem on an intuitive level (Johnson, 2013).

RME is an instructional design theory that is grounded in the belief that students' formal mathematics skills can be developed by engaging in mathematical activities formal mathematics

can be developed by engaging in mathematical actives that will progressively expand students' common sense (Johnson, 2013). Freudenthal believed that mathematics was approached as a closed system and students were given ready-made mathematics, when they should be allowed to participate in the education process by creating mathematics strategies and understandings on their own (Freudenthal, 1973 as cited in Barnes, 2005). Wherefore, Freudenthal proposed that mathematics activity should entail mathematizing and organizing subject matter that comes from students' perception of reality (Barnes, 2005). Education should afford students the opportunity to re-invent mathematics through guided practice.

Summary

This review of literature reported research findings related to the assessment of factors that influence the achievement of middle school students enrolled in rural schools in the state of South Carolina. The framework of this study is The Culturally Responsive Teaching Theory (CRTT). The National Council of Teachers of Mathematics (NCTM) highlighted the need to reconstruct mathematics education in the 1980 publication, *An Agenda for Action* (Klein, 2003). Conventionally, rural education aligned with local community values and ways of life (Theobald & Nachtigal, 1995).

Improving the teaching and learning of mathematics has been a goal of educators and reformers for decades. In a meta-analysis of the research on mathematical knowledge, teaching, and learning, Ball, Lubienski, and Mewbom (2001) wrote that several efforts to improve and reform mathematics have occurred over the past 40 years, but that change has been difficult (Ball et al.., 2001). Many factors influence a student's achievement in learning mathematics. Of primary interest for this study are parental involvement, gender, socio-economic status, school setting, and ethnic group.

Current literature illustrates the positive effects of parental involvement in elementary, middle, and high school students' academic achievement (Cheung & Pomerantz, 2011). After a meta-analysis of 1500 cross-cultural studies, Maccoby and Jaklin (1974, as cited in Bezzina, 2010) affirmed that after age 11, gender disparities in mathematics begin to develop. Many studies have sought to clarify the association between socioeconomic status and academic performance (Lam, 2014). Students with low socioeconomic (Richland One School District Assessment Data) status usually perform poorly academically due to limited access to vital resources (Eamon, 2005). According to Osokoya and Akuche (2012) multiple studies have been devoted to investigating the effect school location has on student achievement. Education research reveals a pattern in racial and ethnic disparities in academic achievement, wherein African American, American Indian, Latinos, Southeast Asian groups perform significantly lower than their Caucasian and Asian American counterparts (American Psychological Association Presidential Task Force on Educational Disparities, 2012).

CHAPTER 3

METHODOLOGY

Introduction

The purpose of this qualitative, phenomenological study was to explore how parental involvement influences the development of students' learning mathematical skills in rural schools in South Carolina from the parental perspective. The researcher compiled perceptions of parental involvement by means of questionnaires based on Epstein's Framework of Six Dimensions of Parental Involvement. The dimensions are parenting, communication, volunteering, learning at home, decision-making, and collaborating with the community (Epstein, 1995).

This chapter includes discussion of the statement of the problem, research questions, research design, and research rationale of the study. Additionally, this chapter provides description of the research setting, population sample, discussion of selecting participants, as well as the sampling method, instrumentation, procedures, data collection, triangulation, and fieldwork. Conclusively, this chapter includes interviews, documents, ethical considerations, and a summary of the chapter.

Statement of the Problem

There is a limited amount of information concerning the role of the parent in assisting their children academically in the content area of mathematics in rural public middle schools. Even though the United States Department of Education has a definition of parental involvement, and educators have developed involvement policies, there often remains a disconnect between how educators and parents define parental involvement as it relates to mathematics education.

Research Questions

To achieve the purpose of this study, the researcher explored the following research questions:

RQ 1: What is the role of the parent in assisting and developing mathematical learning in a rural public middle school in South Carolina?

RQ 2: How do parents perceive the role of the teachers in the students' mathematics learning?

RQ3: How do parents prioritize the importance of math and other academic subjects?

Research Design

This qualitative study followed a phenomenological approach. Patton (2015) avows qualitative research is suitable when there is a problem or issue that needs to be explored. Qualitative research is an effort to understand the nature of a setting and the experiences others have in this context (Merriam, 1998). It does not forecast what may happen in the future; rather, it is an analysis that provides a depth of understanding for those who are interested in the events of a particular setting and time.

"Phenomenology is a form of qualitative inquiry in which researchers aim to develop new understandings of human lived experience, relying on first person accounts generally obtained through participant interviews" (Gentles, Charles, Ploeg, & McKibbon, 2015). Phenomenology is a relevant philosophical methodology that researchers utilize to describe issues such as the phenomena of parent perceptions of parental involvement in assisting students with the development of learning mathematical skills. During the 20th century, Edmund Husserl became known as the pioneer of phenomenology (Guigon, 2006). Husserl believed that in order to separate science from philosophy, researchers needed to direct their attention towards

meanings that connect our experience of objects (Guigon, 2006). Moustakas (1994, as cited in Zeeck, 2012) declares that phenomenological principles affirm that scientific examination is valid when the information obtained comes from robust description, which allows for an understanding of the essences of experience. The philosophical phenomenological method encompasses four interlocking phases: epoche, phenomenological reduction, imaginative variation, and synthesis.

The epoche is a warning to be cognizant of what actually exists, and to stay away from the familiarity of everyday happenings, events, and people. The second phase, phenomenological reduction, brings precision to research findings. Imaginative variation seeks possible meanings through differing perspectives, roles, and functions (Zeeck, 2012). The synthesis of meanings and essences is a process to bring all fundamental, structural, and textural descriptions into a combined statement of the essences derived from the experiences of the entire phenomenon (Zeeck, 2012). The investigator provided rich descriptions of participants' perceptions of parental involvement in students learning mathematics.

Research Rationale for the Study

The phenomenological approach was utilized to comprehend participants' significance of the phenomenon being examined (Creswell, 2003). Maxwell (1996) stated that a phenomenological approach is best suited when an investigation has three important purposes: a) generating results and theories that are understandable and experientially credible, b) conducting formative evaluations to improve existing practice, and c) engaging in collaboration with practitioners or research participants.

The scope of this study fell within the context described and sought to gain a deeper understanding of the problem. For example, although the ambiguity has evolved over time, it is

challenging to define clearly parental involvement as it relates to mathematics learning. Studies illustrate that parent's expectations and beliefs about their children can predict student achievement in elementary and middle school mathematics (Epstein, 2005). However, as math progressively becomes more complicated throughout the grades, parental involvement in students' mathematics tends to decrease (Watson, Sanders-Lawson, & McNeal, 2012). As a result, it was challenging to define parental involvement as it pertained to mathematics education.

The qualitative phenomenological approach to the study helped to define and describe parental involvement in mathematics learning. There is an abundance of information regarding parental involvement in many aspects: however, there is a scarce amount of information regarding parental involvement and mathematics achievement.

Instrumentation

Research Setting

The setting for the study was in the Midlands area of South Carolina. The descriptions below offer vivid pictures of the community from which researcher recruited the participants. The setting for this study was in P. Clark, South Carolina. P. Clark, South Carolina is an area serviced by one of the larger school districts in South Carolina. There are 52 schools in the district (28 elementary, 9 middle, 7 high schools, 8 special schools/centers). The district has 4,229 employees, of which 2,057 are teachers (P. Clark School District Assessment Data, 2015). It serves over 23,000 with a student racial composition made of 73% African-American, 19% White, 8% of other races. Approximately 67% of the student population receives free and reduced lunch services (P. Clark School District Assessment Data, 2015). For the purposes of

the research, the four middle schools that service the community are described below. The researcher provides data on the two urban schools to show how the rural schools perform compared to their urban counterparts, even though they service the same geographical region.

Rural Schools Setting. Septima, South Carolina, is the 138th most populated city of the 396 cities in South Carolina. In 2013, the median income of households was a little over $37,000, as 25.4% of residents live in poverty. The racial breakdown is 75% Black, 21.9% White, and 3% Hispanic.

The goal of Title 1 is to provide a high-quality education for all students, and is the largest federal-assistance program. The State Educational Agency (SEA) allocates funds to school districts based on the number of low-income families that it serves. In turn, the local school district, also known as the Local Education Agency (LEA), identifies eligible schools and distributes Title 1 resources (U.S. Department of Education, 2015). The Title 1 program follows the rules and regulations established by the No Child Left Behind Act (NCLB) of 2001. The NCLB requires that each Title 1 School make Adequately Yearly Progress (AYP) towards the goal of all students scoring at the highest level on the PASS test (P. Clark School District Title 1 Program, 2015).

*School A***.** School A is a Title 1 middle school, serving a population of 522 students in grades 6-8. The poverty index is 90.91. This indicates that 90.91% of the students qualify for Medicaid, and free or reduced lunch. Table depicts the 2013-2014 overall performance of students on the South Carolina Palmetto Assessment of State Standards.

Table 1

School A, Title 1 Middle School, Overall Performance on PASS

Title 1 - School A	Not Met (Below Grade Level) (Math/Reading)	Met (Grade Level) (Math/Reading)	Exemplary (Above Grade Level) (Math/Reading)
6th Grade	51.1%/ 44.8%	36.8%/ 32.2	12.1%/ 23.0%
7th Grade	55.9%/ 52.4%	36.5%/ 31.8	7.6%/ 15.9%
8th Grade	48.9%/ 43.7%	35.6%/ 33.3	15.5%/ 23.0%

School B. School B is a Title 1 middle school serving a population of 529 students in grades 6 through 8. The poverty index is 91.4, indicating that 91.4% of the students qualify for Medicaid and free or reduced lunch. Table 2 depicts the 2013-2014 overall performance of students on the South Carolina Palmetto Assessment of State Standards was as follows:

Table 2

School B, Title 1 Middle School, Overall Performance on PASS

Title 1 – School B	Not Met (Below Grade Level) (Math/Reading)	Met (Grade Level) (Math/Reading)	Exemplary (Above Grade Level) (Math/Reading)
6th Grade	51.3%/46.4%	34.0%/26.5%	14.7%/27.2%
7th Grade	48.1%/45.7%	39.5%/26.5%	12.3%/21.0%
8th Grade	51.9%/47.0%	41.0%/33.9%	7.1%/19.1%

Urban Schools Setting. P. Clark, South Carolina, is the largest city in South Carolina. In 2013, the median income of households was a little over 41,096. The city is 100% urban with no rural regions. The racial breakdown is 45.98% Black, 49.22% White, 3% Hispanic, and 1.8% of other ethnic groups.

School C. School C is an urban middle school serving a population of 894 students in grades 6-8, of which 48% of the students qualify for Medicaid and free or reduced lunch. Table 3 illustrates the 2013-2014 overall performance of students on the South Carolina Palmetto Assessment of State Standards was as follows:

Table 3

School C, Urban Middle School, Overall Performance on PASS

Urban – School C	Not Met (Below Grade Level) (Math/Reading)	Met (Grade Level) (Math/Reading)	Exemplary (Above Grade Level) (Math/Reading)
6th Grade	29.5%/28.1%	30.5%/22.2%	39.6%/49.7%
7th Grade	25.7%/23.9%	31.8%/32.4%	42.4%/43.7%
8th Grade	24.7%/29.6%	40.6%/23.9%	34.6%/46.4%

School D. School D is an urban middle school serving a population of 1,061 students in grades 6-8 wherein 37.4% of the students qualify for Medicaid and free or reduced lunch. Table 4 demonstrates the 2013-2014 overall performance of students on the South Carolina Palmetto Assessment of State Standards.

Table 4

School D, Urban Middle School, Overall Performance on PASS

Urban – School D	Not Met (Below Grade Level) (Math/Reading)	Met (Grade Level) (Math/Reading)	Exemplary (Above Grade Level) (Math/Reading)
6th Grade	30.1%/23.8%	31.0%/23.5%	39.0%/52.7%
7th Grade	24.9%/26.0%	26.8%/21.6%	48.4%/52.3%
8th Grade	30.5%/30.8%	36.6%/26.2%	32.8%/43.0%

Population Sample

Snowball sampling happens when the researcher requests research participants to ask for

assistance in identifying other potential subjects with similar characteristics of research interest (Noy, 2008). Qualitative sampling, however, is less direct and is not a single planning decision, but it is a series of decisions throughout the process of research (Emmel, 2013). The researcher then makes adjustments and considers the implications of sampling on interpretation. Patton (2015) affirms qualitative research generally targets a small sample size that is purposely selected by the researcher to allow for investigation into a specific phenomenon. Creswell (2014) supports this statement, purporting that qualitative research, particularly a phenomenological study, should aim for a sample size ranging from 3 to 10.

The researcher used snowball sampling. Snowball sampling is a recruitment technique in which research participants are asked to assist researchers in identifying other potential subjects. The use of currently enrolled research participants to recruit additional research participants may be approved by the Institutional Review Board under some circumstances. However, the protocol must include justification of the use of this method in the context of the study and target population. The method that minimizes risk would be the preferred choice (Noy, 2008). One means of reducing the risks in snowball recruitment is for the researcher to ask subjects whether they would be willing to pass some information about the questionnaire, survey, or other instrument they just completed to other potential subjects. The snowball sample for this study came from parents of math students in grades 6-8. As such, selected parents must have met the requirement of currently having a child in a math class in grades 6-8.

Description of Sample

This investigation was located in the Southeast region of the United States in the midlands of South Carolina. There was a sample of 14 participants to include a math teacher,

physical education teacher, social studies teacher, banker, therapist, an assistant principal, Federal Emergency Management Agency contracting specialist, English language arts teacher, United Postal Service intake specialist, retired military sergeant, a restaurant hostess, nursing student, assistant superintendent, and an assistant principal. All are parents of students in grades 6-8 in a rural middle school.

Data Collection

The researcher collected data using face-to-face and online interviews. The snowball sampling method was used to obtain participants. Before data collection began, the investigator gained approval to initiate this study from the Institutional Review Board at the school district in South Carolina. The school district, however, did not have an Institutional Review Board policy concerning parents.

Face-to-face Interviews and Online Interviews. Interviews consisted of face-to-face, one-on-one contact with participants. Interviews were audio-taped to provide maximum interaction with each participant. The researcher recorded field notes by hand in a non-obtrusive manner to allow the recording of non-verbal cues when appropriate.

Participants provided an informed consent form, which stated the purpose, duration of the study, procedures, and possible risks throughout the study. The researcher also assured participants that information gathered during the interview process would be treated confidentially. Participants were reminded of their right to withdraw from the study at any time without penalty.

The investigator used interview protocols, consisting of open-ended questions, to explore the perceptions of parental involvement, as it exists among parents. Although the interview guides were prepared to ensure systematic data collection, there will be no predetermined

responses and the investigator was free to inquire within areas of inquiry (Hoepfl, 1997). The following overarching questions derived from the problem statement to elicit insight and deeper understanding of the research problem into the purpose of the study:

1. How do highly involved parents describe parental involvement with respect to their child's education?
2. How does parental involvement promote better student achievement in mathematics and school performance?
3. How does the parent feel about their students' mathematics curriculum?
4. To what degree and in what manner do you feel that your involvement has impacted your child learning mathematics?

Interviews were audio-taped and personally transcribed along with the podcast. This allowed the researcher to gain a better understanding of the data and provided extra opportunities for reflection between interviews.

Document Analysis

During the research process, the researcher is allowed the opportunity to collect public or private documents (Creswell, 2014). Patton (2002) suggested that documents in the qualitative study possibly would unveil situations that occurred before the study (p. 293). The documents collected from the parents were a parental involvement policy and a state parental involvement guide. Both of these documents were public, as such no permission was needed to obtain the information.

Triangulation

Triangulation enhances the credibility of the study and supports the research when

numerous methods are used in an investigation (Patton, 2002). To increase the validity of this study, face-to-face interviews, an on-line interview questionnaire, and document review were utilized. Creswell (2007) declares that triangulation increases confidence in the research data, assists in gaining a better understanding of the problem, and may reveal exclusive outcomes. Additionally, Patton (2015) suggests two advantages of triangulation included, but was not limited to, increasing certainty in research statistics, as well as disclosing unique findings (Patton, 2015). Cross-verifying the different data sources enhanced the validity of the data. Employing this method with the face-to-face interviews, online interviews, and document review allowed the researcher to find inconsistences and commonalities, which aided in developing themes.

Ethical Considerations

Creswell (2014) emphasizes the responsibility to respect the participants' rights, needs, requests, and standards. The ethical protection of participants was vital during the interviews. Prior to the interviews, the participants were asked to sign a consent form, which included an explanation of the study, permission to be audiotaped, and an option to retreat at any time. At the beginning of contact, participants received the consent form that explained the purpose of the study, and the option to withdraw at any time. All information pertaining to the participants remained confidential throughout the study. Participant signatures and agreements were secured and filed. The investigator used numbers to identify parent participants in the study (e.g. participant 2, participant 13) to protect privacy. The procedures protected all participants and kept them free from physical, mental, and emotional harm throughout the study. The researcher followed all local, state, and national regulations.

Summary

This study explored parental perceptions of parental involvement in mathematics learning. Chapter III introduced the research design and methodology for this qualitative phenomenological study. Presented were the research questions, study setting, demographics and sample population. The instrumentation, data analysis, and procedures used to conduct this investigation were also presented.

Moreover, the outline of the chapter summarized the statement of the problem, research questions, research design and rationale of the study. This chapter also discussed the researcher's role and measures to ensure ethical practices and confidentiality procedures. Additionally, this methodology chapter presented limitations and delimitations, as well as the research setting, population, sampling methods, a profile of potential members of the study and role of the researcher. Chapter III also addressed, an explanation of the instrumentation, procedures, data collection, and ethical considerations. Chapter IV offers the results and findings of the inquiry. Chapter V provides a detailed analysis of the findings, conclusions, implications and recommendations for future research.

Chapter 4

FINDINGS

Introduction

With parents being considered a child's first teacher and home being the first classroom (Berger, 1991), the significance of parental involvement remains a vital factor in educating children. Research conducted by Cai, Moyer & Wang suggests that the role of the parent as the motivator and monitor has a substantial influence on the student's mathematics achievement (O'Sullivan, Chen, & Fish, 2014). The purpose of this study was to describe parental involvement in assisting students with the development of learning mathematical skills in rural schools in South Carolina from the parental perspective. Chapter I addressed parental involvement in middle school math in the broader context of national, state, and local challenges. Chapter II reviewed historical and current literature related to parental involvement, math education, and rural middle schools. Chapter III discussed the research design and methodology that supported the investigation. Chapter IV revisits the problem statement, research design and research questions. Moreover, this chapter reviews participant recruitment, demographics, and descriptions, data collection and analysis, presents research findings, and a summary.

Restatement of the Problem

For decades, educational leaders have voiced concerns about the lack of parental involvement, and the issue of parental involvement has received much attention due to the correlation of parental involvement and student success. Past and current research has shown that students, whose parents are positively involved in their children's education, tend to obtain high academic achievement, especially in mathematics (Epstein, 2001; Knipping, Reid, Gellert, & Jablonka, 2008). Although, parents and teachers agree that parental involvement in children's

schooling is vital to their academic success, regrettably, there is a shortage of U.S. parents effectively involved in their children's math education (Eccles & Harold, 1996).

Review of Research Design

The researcher used a qualitative phenomenological approach to collect information from a snowball sample of 14 middle school parents and their lived experience of their involvement in their students' mathematics learning. Phenomenology discerns commonality among all members as they undergo experience of a phenomenon (Creswell, 2013). Snowball sampling occurs when research participants are asked to assist the researcher in identifying other potential subjects with similar characteristics that are of research interest (Noy, 2008). Three study subjects contributed to face-to-face interviews. Eleven subjects participated in the online interview process. The data from both interview methods were used to answer the following research questions:

RQ 1: What is the role of the parent in assisting and developing mathematical learning in a rural public middle school in South Carolina?

RQ 2: How do parents perceive the role of the teachers in the students' mathematics learning?

RQ3: How do parents prioritize the importance of math and other academic subjects?

Participants answered 6 demographic questions, 9 open-ended questions, 9 scale questions, and 1 ranking question. These questions provided the framework that allowed parents to explain their beliefs in regards to parental involvement in mathematics learning. In addition, the researcher conducted a document review and completed a textural analysis of the school district's Parental Involvement Policy, and Increasing Parent Involvement in Education: A Resource Guide for South Carolina Communities.

The researcher identified a total of 6 themes: three from the face-to-face, and three from the online interviews. Moustakas' epoche, basic description, and synthesis methods, along with Husserl's bracketing concept was utilized to identify the topics (Creswell, 2013). Themes representing lived experience exposed shared perceptions, concerns, and clarifications of parents of rural middle schools students in regards to personal perceptions of their role in mathematics learning. Thematic aggregation included gathering interview responses, in addition to textural and structural synthesis (Patton, 2015). Furthermore, data were transcribed precisely as stated by the participants. Commonality was discovered in all stages of data gathering process.

Procedures

Participant Recruitment

A small number of middle school parents in rural South Carolina were afforded the opportunity to participate in the study. The parents provided contact information that consisted of phone numbers and personal emails. The researcher sent emails to prospective participants inviting them to participate. Enclosed in the email were attachments (Richland One School District Title 1 Program) research study letter of invitation, (2) research study letter of invitation response form, (3) consent letter, (4) and interview protocol letter. Additionally, hard copies of all attachments were available upon request and given to the in-person interview participants. Furthermore, the researcher invited middle school math parents who attended two after-school events. A brief description of the study, as well as the link to complete the online interview was emailed to every parent that gave contact information. Due to the lack of parental involvement in the chosen rural area of South Carolina, there was only a small amount of parents who attended the events, which is why the snowball sampling method was employed. The three parents who attended the afterschool event referred other parents who were of research interest.

Subsequently, 14 middle school parents of the rural school district agreed to partake in the study. The four parents who attended the afterschool activity agreed to participate in the face-to-face interviews, while the other 10 referred parents agreed to participate in the online interviews.

Participant Demographics

The table below represents the parents' demographic information relating to gender, age, ethnicity, family status, and number of children living in the household.

Table 5

Participant Demographics

Parent	Gender	Age	Ethnicity	Family Status	# of children in household
P1	Female	45	African American	Single Parent/Guardian	1
P2	Female	56	African American	Single Parent/Guardian	2
P3	Male	47	African American	Married Parents/Guardians	2
P4	Female	31	African American	Married Parents/Guardians	2
P5	Female	37	African American	Married Parents/Guardians	1
P6	Female	46	African American	Single Parent/Guardian	1
P7	Female	42	African American	Single Parent/Guardian	2
P8	Female	35	African American	Single Parent/Guardian	1
P9	Female	44	African American	Married Parents/Guardians	2
P10	Male	40	Multiple Ethnicity	Married Parents/Guardians	2
P11	Male	33	African American	Married Parents/Guardians	3
P12	Female	31	African American	Non-Married Parents/Guardians	2

P13	Male	39	African American	Married Parents/Guardians	1
P14	Female	41	African American	Married Parents/Guardians	4

Participant Descriptions

Parent 1 is a native of Jacksonville, Florida, but currently resides in South Carolina as a licensed therapist. The African American woman is a single parent with only one child in middle school. She attended elementary through high school in rural South Carolina. The therapist has a Bachelor's degree in Psychology and a Master's degree in Counseling Psychology. Participant 1 ranked the following the subjects in order of importance: reading, mathematics, science, and social studies/history.

When asked why she ranked the academic subjects in the above order, the therapist declared,

> Reading is most important to me because we have to be able to comprehend what we read, speak, and hear. Math is and will always be a part of our daily lives in some way. Science is all around us. Finally, history is how we got here but it also allows us to discover what's needed in the future for the betterment of mankind.

Parent 2 is an African American female and assistant principal at a local charter school. The charter school is 90% African American and has a school rating of 'B'. The educator is a 56-year-old single parent with two children. The individual has been in the education system for over 20 years. Participant 2 has a Bachelor's degree in Education, Master's degree in Education Leadership and a doctorate degree in Education Management.

In regards to being involved in her child's mathematics learning, the educator avowed,

> Even though I can't assist my daughter much, I make sure I stay in touch with the teacher and know her progress and what she should be doing. I believe she could do even better if I was more proficient in math.

Parent 3 is 47 years old and is one of the four African American male respondents. A married father of two, the individual works as a contracting specialist for the Federal Emergency Management Agency (FEMA). The oldest child is in 10th grade and the youngest is in 7th grade. The contributor agrees that mathematics has helped him to be successful in life and strongly agrees that math is needed for his career.

A native of South Carolina, parent 4 is a 31-year old African American female, high school English teacher at an urban high school. The school is 50% Caucasian and 40% African American and 10% other nationalities. The individual is married with two children. The English educator has a Bachelor's degree in English, a Master's degree in English, and has a Reading endorsement. This teacher has been teaching since 2008, and prior to being a high school teacher, the contributor taught middle school in a rural area.

When asked what could teachers do to help parents become more involved in mathematics learning, the educator stated,

> As an English teacher, I have a hard time getting parents to be involved. As a parent, I know many people tend to shy away from mathematics because they do not understand it. Understanding both perspectives, I believe math teachers should offer various sessions for struggling students and parents. This allows the interaction to take place between all stakeholders, the teacher, the parent and the student. This 'new math' can be very intimidating and unless you are a math guru, you have no idea how to be involved. Helping parents understand what their child is learning and offering in-depth tutoring services will be a great help.

Parent 5 is a 37-year old married African American female who works for United Parcel Services (UPS). There is only one child in the household. Prior to working at UPS, the individual worked in the health care field as dialysis technician. The parent strongly disagrees that they need math for their career, however, strongly agrees that math is useful in everyday life. Participant 5 supports mathematics learning at home by engaging in everyday mathematical

activities with the child, such as counting money and measuring items for cooking.

Retired military, participant 6 is a 46-year-old single mother. The individual now works as a claims supervisor for United Services Automobile Association (USAA). Being the only respondent ranking mathematics as number 1, participant 6 states,

> Math is important because money runs the world as far banking, purchasing homes and cars, balancing accounts and interest rates.

The parent feels that her parental involvement has a huge impact on her child learning mathematics, as she makes sure the student has a tutor when she does not understand the math material.

Parent 7 is 42-year-old single mother of three. The individual works as a hostess manager for Longhorn steakhouse and strongly disagrees that she is good at mathematics. The respondent completed the online interview and skipped four open-ended questions. Participant 7 stated her efforts to be involved in her child's mathematics learning has resulted in a positive outcome, as the student has become better at math and enjoys doing it.

Parent 8 is a part-time substitute teacher and nursing student. The 35-year-old African American single mother has one child and agrees that math is needed and useful in everyday life. The respondent is highly involved in the student's mathematics learning by checking homework and making sure the student understands how he solves the problems.

Parent 9 is the director of the Office of Board Governance. The education administrator holds a Bachelor's degree, Master's degree and Doctorate degree in the field of education. The 44-year-old married mother has two children in middle school, one in grade 6 and the other in grade 8. When describing how the school or teachers could help her become more involved in her children's mathematics learning, the individual declared,

> As a currently involved parent, I would like to be further educated on the math curriculum being used in my children's classroom.

Parent 10 is a 40-year-old married father of two, with one student in middle school. The assistant principal has Bachelor's and Master's degrees in education and currently works in a rural school district in South Carolina. Prior to becoming an assistant principal, participant 10 taught middle school mathematics. When describing what parental involvement meant, the education administrator affirmed,

> Parental involvement means the parent is actively involved in their children's education through Parent Teacher Organization (PTO) or other school organizations, communication with teachers, and assisting with homework or projects.

Understanding that parental involvement has a direct impact on mathematics learning, the educator stated,

> Being involved at school as an educator has helped emphasize the importance of education to my children, not matter the academic subject. My children know that all subjects are important and because I was once a math teacher, they feel obligated to do well in that specific subject.

The next four parents described below participated in the face-to-face interviews.

Parent 11 is 33-year-old male physical education teacher and coach. The individual is married with 3 children and is currently employed in a rural school district in South Carolina. The contributor feels that he has a strong influence on the student's mathematics learning, as he is involved in in-school and out-of-school functions. The aspiring administrator tutors students in mathematics after school, as well as pulling a small group of struggling students during the school day. Participant 11 acknowledged the need to increase parental involvement, and has put forth efforts to do so by hosting school events such as, parent versus student basketball games.

The respondent affirmed,

> As a coach, you would think that I see an influx of parents showing up for basketball or football games, however, I only see the faithful few. Parental involvement in this area is a critical issue. As a parent, I don't understand how parents aren't fully involved in academics and athletic activities. Speaking with many of the parents about their involvement, I've found they feel like showing up is enough, or if their child is doing ok, then they are doing their part. I don't know if some of these parents don't understand what it means to be truly involved and if they don't, maybe as educators, maybe we as educators should tell them our expectations.

The 12th parent is an African American female social studies and math teacher. The educator is married with 4 children, and has been teaching for 10 years. Presently, participant 12 is teaching in a rural middle school in South Carolina, which is 98% African American, 1.5% Latino, and 0.5% Caucasian. The school enrollment is at 165 students, and the individual teaches approximately 60 students. The school functions on a block schedule, however, due to low test scores, recent changes have been made. She sees the 60 students on a daily basis. The A-Day schedule is strictly for social studies and the B-Day schedule is used as enrichment. The individual came into education through an alternative education program, as she did not graduate from a school of education. The contributor does have a Masters of Education degree in teaching and learning. Before teaching in the rural public school, participant 12 taught in the private school sector, where certification was not required.

When asked to define parental involvement, the educator affirmed,

> Parental involvement includes reading to and with a child at home, assisting with homework and projects, attending parent-teacher meetings, and taking advantage of school functions such as Parent Night and other academic functions.

The parent ranked reading as the most important academic subject but also asserts that she is heavily involved in the student learning mathematics and stated the following,

> In regards to math, my role is to support and encourage my child to work hard and study diligently. My role is also to work with them on any math concepts, such as solving

> equations. And if I can't help them, then I find someone who can. And to support mathematics learning, my child has access to math games on the internet that build and support math skills. I also download math worksheets for me to work on over the weekend, and they use IReady.

Parent 13 is a 31-year-old African American female who works at a local bank. She recently graduated with a Master's degree in business education. The individual has two children, one in 6th grade and one in Kindergarten. The contributor strongly agreed that she does not have much interest in math and strongly disagreed that she was good at mathematics.

> When describing how she felt about the math curriculum, participant 12 affirmed, I don't think the curriculum is conducive to what he'll be utilizing as he gets older. I am not sure if the math my child is learning will be needed for him to be successful. I make sure my child does well and completes all assignments but I am not involved as I should be.

Parent 14 is 39-year-old married father of two. The individual is currently teaching 6th grade mathematics in an urban school district, which is 60% African American, 30% Caucasian, 5% Latino and 5% other. The educator agrees that he is good in math and helps his child with math homework. However, parent 14 acknowledges that he does not check his child's math homework for completion.

The contributor declared,

> My involvement has had minimal impact on my child learning mathematics. My child is already good in mathematics and she likes it. As an educator, you would think I would be heavily involved, especially in mathematics but I am not. I am there when she needs me. She does well, so I don't have to be too involved.

Data Collection and Analysis

When conducting qualitative research, data collection and analysis rely heavily on textural data (Patton, 2015). The researcher is does the data collection and is very involved

throughout the process (Lincoln & Gouba, 1985). Data analysis included organizing document review data, transcribing interview data, reviewing interview transcripts for emergent themes, and coding interview data.

By identifying biases and using bracketing, the researcher sought to guard against interpretive errors while disaggregating the data (Creswell, 2013). Triangulated data acquired from face-to-face interviews, and participant responses to interview questions delivered in an online format, are discussed in the following sections.

Trustworthiness

Qualitative research is often criticized regarding its validity and reliability. Trustworthiness is the measure of the worth of any qualitative study. To address this perceived shortcoming, several writers on research methods, such as Lincoln and Guba (1989), proposed four different standards of trustworthiness:

a. credibility (internal validity);
b. transferability (external validity);
c. dependability (reliability);
d. confirmability (objectivity).

Triangulation, thick and robust descriptions, and inquiry auditing were used to yield such criteria (Lincoln & Guba, 1989). As a means to strengthen credibility and confirmability, triangulation of the data was utilized (Patton, 2002). Face-to-face interviews and an asynchronous online platform were used with the participants, and posed questions regarding rural parents' demographic evidence and their involvement in mathematics learning. A document review of a parent involvement policy, and a resource guide for parents in South

Carolina communities was used to identify, showcase, and advocate best practice programs that increase parental involvement in children's education. Particular emphasis was placed on underachieving students. The researcher also examined United States Department of Education's Dual Capacity-Building Framework for Family School Partnerships, which provided further information regarding parental involvement in South Carolina schools.

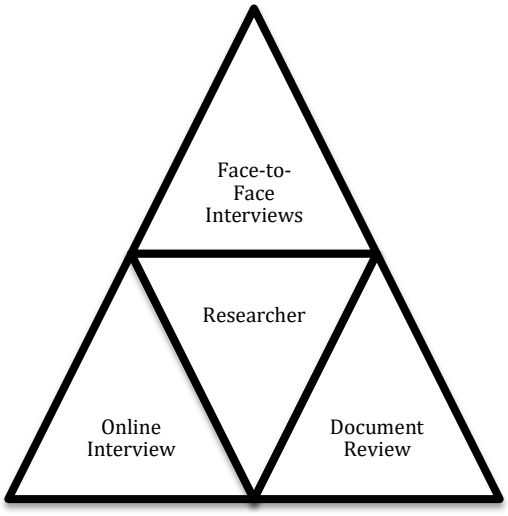

Figure 8. Data Methods for Triangulation.

The researcher utilized thick, rich descriptions to illustrate the discoveries of the research. Description of this quality refers to the fieldwork or data collection of the researcher in detail. The researcher identified patterns of cultural and social relationships precisely and explicated them providing perspective for the reader (Patton 2002). The researcher employed member checking, and elicited participants' cooperation in reviewing transcripts to assure the accuracy of their responses.

Coding

Coding was the primary method of analysis used for this study. Coding delineates

concepts and categories (Research Rundowns, 2005). It is the primary means to examine textual data, and is indispensable in qualitative research design. There are two types of coding. Open coding is the first level, and it involves the researcher viewing raw data in search of different viewpoints and categories (Research Rundown, 2005). Axial coding occurs when the researcher strategically analyzes the text for conformity and relationships (Patton, 2015). Utilizing the open coding method, the researcher highlighted key words the same color and used different color highlights to differentiate between categories and ideas. Axial coding was then used to review concepts and categories generated during the open coding process. Axial coding ensured the concepts and categories represented the interview responses accurately (Patton, 2015). The investigator identified three themes that emerged from the online interview data and three themes from the face-to-face interview data.

Findings from Interview Questions

This portion of the chapter explains data outcomes from triangulated data derived from participant responses to interview questions delivered in an online format, and to questions from the face-to-face interviews. Moreover, findings from the resource guide document analyses are also presented.

Face-to Face Interview Data

The responses of participants were collected into themes based on similarity and meaning of experiences. Emergent themes presented below are the result of data collected from the face-to-face interviews. Table two illustrates an overview of emergent themes derived from these data sources.

Face-to-face interview questions were displayed to collect the emergent themes.

Participants' textual quotes follow to illustrate the theme. The quotes are the taken precisely from the interview transcripts. The quotes that are applicable to the emergent theme appear under the discussion.

Table 6

Themes Formulated from Face-to-Face Interviews

Theme	Theme Descriptions	% of Participant Discussing
Theme 1	Connection Between Reading Comprehension and Mathematics	80%
Theme 2	Parental Involvement In Mathematics Defined by Student Understanding	100%
Theme 3	Minimal Understanding of Math Curriculum Yields Limited Engagement	100%

Emergent Theme 1: Connection Between Reading Comprehension and Mathematics

Past research conducted by MacGregor and Price (2009), the connection between language proficiency and trends in math performance are hard to separate from social and cultural factors**.** Vocabulary, number sense, as well as the ability to read and comprehend words problems are important factors effecting mathematics achievement (MacGregor & Price, 2009). Being able to think mathematically is reflected by the ability to read and comprehend mathematical symbolism much in the same manner as reading words.

Reading and math have multiple commonalities. They are both abstract, symbolic, cognitive processes and they both require some working knowledge of discrete skills (Fite, 2012). However, many students who score well on reading and computational skills tests do not

score well on tests of mathematical problem solving. This happens due to the incorrect assumption that students transfer skills used in reading stories to reading word problems. Consequently, this type of assumption overlooks the different role that reading comprehension plays in math problems, and ignores the thinking skills and recoding of math material needed to do problem solving (Fite, 2012).

The interview questions associated with this emergent theme are included.

Question 20 asked participants to rank the importance of the following academic subjects: reading/language arts, science, mathematics, and social studies/history. Question 21 and Question 22 are associated with their ranking choices.

Interview Question 20. Please explain your ranking choices for Question 21. Why do you feel like that subject you chose as number one is the most important?

P11: I chose reading because research shows that students who are not reading on grade level are four times less likely to graduate high school. Even as a child my parents always stressed the importance of learning to read. I believe that if you can read and comprehend well, then you can do well in any other subject. Every subject involves reading. If you don't know how to read, you can sign your life away and not even know it.

P12: Reading comprehension and vocabulary is the foundation and basis of all academic content. As a social studies teacher, I see students who struggle simply because they can't read and understand the material. It's not that they aren't able to understand what is being taught. They simply can't read the information that is placed in front of them. I believe it's very sad that many of my students cannot read and I do no understand how they will be able to make it through life not being able to read. How can you fill out an application for a job if you don't know what they are even asking you?

P13: I believe that you need to be able to read, write and comprehend in order to be successful in the other subjects. Even as a banker, I have to be able to read in order to do my job effectively. Most people here banker and think numbers, but that is not the case. The computer screen is not full of just numbers. Those are the very basics.

P14: Without reading and understanding of our language, communication and learning

would be difficult because of a lack of comprehension. In school, you have to be able to comprehend in order to understand what the questions are asking you.

Interview Question 22. How did you rank mathematics and why?

P11: I chose to rank mathematics as number two. I do think that it comes right after reading because you need mathematics in everyday life. You use math to pay bills, to grocery shop and other activities like that.

P12: Mathematics is the second most important subject. I chose number two because although, we use it in everyday life, reading still takes precedent because if you can't read then you don't know what math skills are needed to answer questions. It is also needed for everyday living. We all use math to purchase items small as gum or as large as a house. If you aren't careful and don't know math, someone could potentially cheat you out of your money.

P13: I picked mathematics as the number two most important academic subject. I am a banker, as I stated before, and I realize that I have to read and comprehend my assignments or what the clients are asking. Being able to calculate the mathematics is the easy part. We have computers to give us totals and other computations we need. However, a computer can't comprehend for us. Getting the mathematics piece correct depends on me understanding what is being asked. That's reading comprehension.

P14: As a math teacher, I see that many of my students struggle because they cannot read and comprehend the word problems or the directions. And with a more rigorous curriculum, you can't get by on simple computations. That is why I chose mathematics as number two. Some would see this as a shock since I am a math teacher. I definitely understand the importance of math and how important it is in many career fields, such as being a doctor/nurse, an architect, or a scientist. Being number two doesn't mean I don't see the importance. I am math teacher and I use math all the time outside of the classroom. I just believe that one can survive more with reading skills, then math.

Emergent Theme 2: Parental Involvement in Mathematics Defined by Student Understanding

Past researchers such as Appelbaum (1999), Lehrer and Shumow (1997), and Peressini (1997, 1998) have looked at issues related to parental involvement in mathematics, particularly as they related to mathematics education reform (as cited by Civil, Bernier, & Quintos, 2007). This research points to mixed feelings among parents as it relates to mathematics reform

Interview Question 18. What do you think your role is in your student's mathematics learning?

P11: Preparing her for the upcoming math skills she will need and to make sure she knows the basics. My role here is to try and at least expose her what she will see. I do this through technology and by sending her to camps during the summer. She goes online three times a week to do math lessons and for the past two summers she has attended a STEM camp. I can help her some and sometimes if I can figure out how to do it, I teach myself and then show her. Some of it I recollect doing and some of concepts are foreign to me. So, my role is to make sure she gets the help she needs.

P12: In regards to math, my role is to support and encourage my child to work hard and study diligently. My role is also to work with them in solving problems. When they understand what they are learning, my role slightly changes. If they understand the concept, then, I am just there to make sure they have completed all assignments. I am not good at math, so if I don't have to be too deeply involved then, I'm not.

P13: I think my role in math is to be fully involved but I know I am not involved as I should be. My child does not ask for help with his math homework because he does it in the afterschool program. He holds a B average in math, so I see no need to bother him about his performance in his math class. Now, when I check his grade begins to fall, then I am asking questions to see why he is not performing and we go from there. At one point he wasn't doing that great. I became more involved and made sure his grades improved. Certain grades are not allowed in my household and he knows that. So, by the next progress report, the grade increased. He is pretty good in math. Better than I ever was.

P14: My role is to get my child over the hump and rough parts. If they need my help because they do not understand their math work, I help them or I find them someone who can help them. Sometimes my role is to simply sit down with my child and help them figure it out. We do it together. She is pretty good in math, so I have rarely help with math homework and she does well on tests.

Interview Question 19. How involved are you in other academic subjects?

P11: I am as much involved as I need to be. When my child was not doing well in history, I investigated and realized it was simply because she was not studying. Once I was aware of the situation, I became more engaged.

P12: As a parent, I make sure my child does well in all subjects. I keep track of their grades and make sure they are on the right track. My children are pretty responsible and I am trying to prepare them for high school, so I am involved enough that my kids understand that they must do well or answer to mama. However, I am a tiny bit more concerned with ELA, than any other subject. Maybe it's because I believe being able to read and write is slightly more

important than being great at math.

P13: I am going to sound like a bad parent. They only time I truly get involved with the academics is when my child's grade does not meet my expectations. Now, I attend parent night and other even the school has and I ask the teachers questions to make sure he is doing well. Other than that, I don't ask too many questions about school. It sounds bad but he does well. He's older now, so I don't ask what he learned in school today.

P14: My daughter knows that I keep track of all of her grades through the online grading portal. When I go and see she isn't do well in a certain class, that's when I start asking questions and wanting to see assignments. If she is doing well, then I don't bother her.

Emergent Theme 3: Minimal Understanding of Math Curriculum Yields Limited Engagement

In a study conducted about parental involvement in mathematics, many of the parents seemed supportive of certain practices, such as children sharing their approaches to problems, and were impressed by the different kinds of mathematics that the children were exploring (Civil, Bernier & Quintos, 2007). Yet, many of them expressed anxiety at the changes, especially in relation to their frustration at not being able to help the children with homework (no textbooks, or no familiarity with the content their children were studying), and in relation to the apparent switch to less practice of basic computational skills.

Interview Question 23. How do you feel about the mathematics curriculum that you child is learning?

P11: I believe the math curriculum is good. It seems like they are learning more and more every year. I do feel that it is rushed though. It seems like the kids are learning too much too quickly. They don't have time to fully grasp one concept before they are learning a new one.

P12: I am not impressed with the mathematics curriculum because it doesn't allow for children to become solid in understanding a standard before they move on quickly.

P13: I don't think the curriculum is conducive to what he will be utilizing as he gets older. I think some of it is not useful now and won't be useful later in life.

P14: I feel it is age appropriate but very rigorous.

Interview Question 27. Are you comfortable with your ability to understand the math curriculum? Does it stop you from being engaged? Why or why not?

P11: I am not that comfortable with this new math. I have never heard or seen some of it. It doesn't stop me from being an involved parent but my engagement is limited.

P12: No, I am not comfortable with the math curriculum that my child is learning and because I am not comfortable, there is a limit on what I can do to help my child. I don't ignore a plea for help; however, I admit that it doesn't come from me.

P13: No, and yes it stops me from being engaged. When my child was younger and learning the basics, I was fully engaged to make sure he understood it. I understood it. I felt like a more involved mother then. Well, a more helpful one. I am not good in math. And the new math curriculum is much tougher than what I learned and that wasn't that long ago.

P14: I am familiar with the math curriculum because I have had some training on it as a 6th grade math teacher but my child is in 8th grade and the few times she has needed help I directed her to my colleague. I would stop her before she could ask me the question.

Online Interview Data

The responses from the online participants were collected into themes based on similarity and meaning of experiences. Four themes emerged from the analysis of data. Textual quotes from participants follow to illustrate the theme. These are verbatim statements from the interview transcripts. Only quotes that support the emergent theme are included under the discussion. Key themes are summarized in Table 3 below.

Table 7

Themes Formulated from Online Interviews

Theme	Theme Descriptions	% of Participants Discussing
Theme 1	Linking the Role Between Parent and Teacher	100%
Theme 2	Limited Knowledge of New Math Curriculum	90%

Theme 3 Assistant Learning at Home Extends Past Homework 60%

Emergent Theme 1: Linking the Role Between Parent and Teacher

Both parents and teachers have an important role to play; their roles do not replace, but rather complement and reinforce the other's role, thus providing the student with a consistent message about mathematics and learning. Thinking of parents and teachers as "partners" refers to this mutual effort toward a shared goal. It also implies shared responsibility of parents and teachers for supporting students as learners (Christenson & Sheridan, 2011).

Interview Question 18. What do you think your role is in your student's mathematics learning?

P1: I serve the role of being a valuable resource to my son's ability to learn mathematics.

P2: I need to make sure my child understands concepts, is attentive in class and grasping the information presented.

P3: To make sure they get an understanding of math from learning it in school to learning in everyday life.

P4: I believe I should be a helper and a facilitator.

P5: My role is to make sure they know the basic math skills they need. If they know those, they can build on them.

P6: Ensure that she gets all the help she needs.

P7: I am supposed to make sure she understands what she is doing and that she is doing it correctly.

P8: My job is to make sure they do well in math class and if they are struggling, I make sure they receive the help they need. If I know how to do the math concept, then I help them but that has been rare since they have been in middle school.

P9: I believe that as a parent, it is my role to supplement what is happening at school and to give my child practical experiences that allows them to apply what they are learning.

P10: My job is to assist and guide my children as they learn new concepts.

Interview Question 24. Please explain the relationship between you and the teacher and explain what you feel the role of the teacher is when it comes to mathematics learning.

P1: The teacher and I are a team when it comes to making sure my child is learning mathematics. The teacher is the pathway to the student not only learning math, but seeing it as something more exciting than a class. I take care of the extended learning at home, however, that is after the teacher has delivered the lesson in school. When my child was in elementary school, I was able to teach them some new concepts at home but the math that they learn in middle school is out of my element. I depend on the teacher to make sure my child is taught how to do it and I make sure they practice at home and get them any outside help they may need.

P2: The teacher should demonstrate problem solving and guide student to understanding concepts and operations so, they can do the work independently and to be able to figure out the next steps to solve problems. The teacher should always model making connections. As a parent, I will also try to make the connections at home, if I can. We have to make it happen together.

P3: The same as the parents. We are both supposed to ensure the child knows and understands math in every aspect.

P4: The parent and teacher help each other out. I believe teachers should introduce the curriculum, facilitate, and to be sure to help students when they don't fully understand concepts.

P9: We work as one unit. The teacher's role is to instruct and to motivate the students to learn while they are at school and I do the same at home.

Emergent Theme 2: Limited Knowledge of New Math Curriculum

Epstein (2005) found that most often the explanation for why students struggle with mathematics is related to one of the following: the mathematics curriculum and instruction, students' attitudes about mathematics, student readiness and background characteristics, and level of support for mathematics in home environments. The authors describe efforts to improve

students' mathematical learning including improving mathematics curriculum, teacher education, and school-wide and district-wide programs, while very little attention is given to building the connections between school and families as a component of mathematics reform.

Interview Question 23. How do you feel about the mathematics curriculum that your child is learning?

P1: The math curriculum seems pretty tough and I think we should go back to basics and foundational math, which leads to higher levels later in school. The "new math" curriculum that my child is learning makes it harder to help the children at home too. I don't understand it and can be a bit frustrating.

P2: I believe the math curriculum is current, and has a rigor. It is sufficient to make sure my child is proficient in navigating what she needs to know to be successful.

P3: I feel it is very different from when I was learning it at their age. I believe its more challenging at an early age. I'm thinking it maybe too much for the kids. Especially trying to teach the middle school students to learn a different way then they learned in elementary school.

P4: I believe it is very challenging and helps her think critically. It seems a little foreign to me though.

P5: I'm happy that the new curriculum is tougher but it makes it harder to help at home. I don't understand much of it but my child picks it up quickly and I am sure it will help her do well in school and college.

P9: I am confused by the curriculum being taught and wonder about how the learning can be applied to practical situations.

Interview Question 25. What could the school or teachers do to help you become more involved in your child's mathematics learning?

P1: Help me help him! I need resources too in order to assist my child when he has a problem. The way math is taught today is very different than when I went to school but the expectation is the same. Get back to the basics.

P2: Maybe have a monthly activity where the child has to complete the math work with the parent. This will help the parent begin to see exactly what their child is learning and it encourages them to be more involved. I would love to be able to engage with my child doing activities that are relevant to school.

P3: By ensuring they are letting the parents know what they are teaching each quarter, which gives the parent the opportunity to figure out what the child is learning. That will help us understand the curriculum.

P4: Schools should offer various sessions after school for struggling students and parents. The students get the help they need and the parent is taught how to help their children at home. I am not aware how to help my child with the math that they are learning now. It is pretty tough and my child struggles and it is hard on a parent to see that and not be able to do anything to help them.

P5: Give the parents detailed notes and homework to make sure that they can do the work because if the parents can't do the work then, they can't help the kids. If they don't send home notes, they could post videos online that show us how to do the concepts that the students were taught in school that day or week.

P9: As a currently involved parent, I would like to be further educated on the math curriculum being used in my child's classroom. I do not know how to help my child since the curriculum has changed. The district should offer classes that will help the parent understand the math curriculum that has been adopted.

Emergent Theme 3: Assistant Learning Extends Past Homework

A widely studied area of parental involvement relates to homework (O'Sullivan, Chen, & Fish, 2014). Although the advantages and disadvantages of homework have been discussed and debated among professionals in education and psychology, there is substantial and growing evidence to support the practice of homework as an effective supplement to in-school learning (Siegler & Mu, 2008), particularly at the middle and secondary school levels (Vukovic et al.., 2013). With respect to homework, parental involvement activities may take different forms, from establishing structures for homework to teaching or guiding for understanding and developing student learning and problem-solving strategies. Consistent parent involvement in children's education contributes to the effectiveness of their involvement, suggesting the importance of examining different types of parental involvement in homework (O'Sullivan, Chen, & Fish, 2014).

Interview Question 17. To what degree and in what manner do you feel that your involvement has impacted your child learning mathematics?

P1: I believe I have had a great impact on my child learning mathematics. I have always guided him to resources to better assist as he sought to learn aspects of mathematics.

P2: Even though I cannot assist my daughter much, I make sure I stay in touch with the teacher and know her progress and what she should be doing. I believe she could do better if I was more proficient in mathematics.

P3: I do not have much impact on my children learning math but my wife is an expert, so she has greatly impacted their math skills.

P4: I believe I have instilled the importance of doing well in math in my children. They know that math is important at home and in school.

P9: I believe that I am greatly involved through math activities in our home. My child has consistently remained at or above grade level in math.

P10: I think my involvement at school, as far as being an educator, has helped emphasized the importance of education to my children. This includes math and all other subject areas.

Interview Question 19. What type of activities do you do at home that you feel support mathematics learning?

P1: We talk about earning, saving and spending money. We also have conversations about credit. Then of course I make sure homework is completed and done to the best of both our abilities.

P2: Cooking, playing math games, travel cost, calculations for tips, cost of food and science experiments are some of the activities outside of homework completion.

P3: First, I make sure homework is done, and then, the act of completing simple activities such as, grocery shopping, getting gas, balancing the budget and cooking is used to support math education.

P4: I teach my children how to manage finances and solve real world problems related to math.

P9: At home we measure and cut boards for art projects, taxes in the grocery store, online math games, weighing and measuring through cooking and baking. You never realize you use mathematics so much until you actually pay attention to it. Of course, I make sure homework is done that is my number one job. We do a lot of extra activities at home and I try to make sure it includes things that deal with the different subjects taught in school. My children are very creative, so I have to get online and find activities that allow their creative juices to flow. It can sometimes be tough when it comes to math because the stuff that I understand is too basic and some of the other stuff is too hard for me to help my children complete.

P10: Assist with homework. I make sure it is neat and completed and that all work is shown.

Document Analysis

Document analysis is a qualitative research method, where the researcher analyzes documents directly related to the topic of study (Bowen, 2009). For this investigation, document analysis included a review of the following documents: the Parent Involvement Policy, and Increasing Parent Involvement in Education: A Resource Guide for South Carolina Communities.

Parent Involvement Policy (PIP)

The policy on parent involvement was developed jointly, and distributed to parents of participating children. Parents were actively involved in the development of the Parent Involvement Policy by serving on planning committees, completing written surveys, and conducting phone surveys. The school district disseminated the policy document to parents through bulk mailings, PTO or PTA meetings, and Title I parent meetings. The document is available at all Title I schools and on the Title I website. Parents are encouraged to be involved in all the activities of the schools including parent training, workshops, and conferences that support student achievement. The PIP implemented the following principles in 2014:

Principle 1

The first principle asserts parents be involved by inviting schools to identify/select parents to attend Parent Advisory Council meetings where they will serve on committees to assist in developing and reviewing the school-wide plans, School Improvement Plans, as well as

the district plan. Parents will also complete an annual survey, which will provide data on program format, preferred service delivery techniques, methods of communication with parents, suggested workshops, and seminars needed by parents to support their efforts in educating their children. Parents will visit and observe classrooms in selected Title I schools once a year to monitor the instructional program and determine how improvements can be made to effectively bring about change. The district will inform parents continuously about the school's progress through school report cards and notices to parents.

Principle 2

The school district will provide the coordination, technical assistance, and other support necessary to assist participating schools in planning and implementing effective parent involvement. Activities will be designed and delivered to schools through joint meetings of other local, state and regional social agencies to improve student academic achievement. School-related activities such as workshops and training will be provided periodically to help parents learn how to help their children succeed in school. Parents suggest topics and plan activities for the workshops.

Principle 3

Schools and parents will develop compacts that will be used to build strong and meaningful parental relationships. The agreement will establish how all will share the responsibility for each student's achievement. Parent surveys are sent to all Parent Advisory Council members for input on programs, training, materials and functions.

Principle 4

Initiatives are underway to involve parents in the Parent Advisory Council, Head Start in

the Richland One area. Programs such as Smart Matters at the identified Title I schools, Foot Steps, First Steps, Success by Six, Parents as Teachers, (the Home Instruction Program for pre-school youngsters), the Parent Child Home Program, and state-run preschool programs continue to keep parents abreast of offerings, encouraging attendance at meetings and trainings, and then follow-up to see if additional help is needed. A Parent-Student Book club also meets monthly to model reading strategies, complete activities and reaffirm the value of families reading together.

Principle 5

The district will conduct an annual evaluation of the content and effectiveness of the parental involvement policy in improving the academic quality of the schools including identifying the barriers to greater participation by parents in activities to determine the effectiveness of the parental involvement policy. This will be accomplished by comparing attendance records of previous years. The district will also conduct parent questionnaires and will distribute them and phone calls made to gather information.

Particular attention is paid to parents who are economically disadvantaged, disabled, have limited English proficiency, have limited literacy, or are of any racial or ethnic minority background. Also, efforts are made to determine why parents do not participate, including barriers to greater participation such as lack of transportation, absence of child care, work schedules, unsuitable meeting times or locations, or lack of interest. Annual parental involvement evaluation surveys will be distributed, and the findings will be used to dictate what changes should be made, and by whom, to make the parental involvement programs more effective and if needed, to revise the parental involvement policies.

A Resource Guide for South Carolina Communities

Parent involvement in a child's education is an essential factor in that child's success in

school, as an adult in the workforce, and as a member of society. The assignment of the Parent Involvement Work Team of the South Carolina Council on Competitiveness' Education and Workforce Development Task Force was to identify, showcase, and advocate best practice programs that increase parent involvement in children's education, with particular emphasis on underachieving students. The report defines "parent involvement" as participating in both child-centered and school- centered involvement, which encompasses child-centered activities such as parents reading to their children and reviewing homework as well as school-centered activities such as attendance at school functions.

The team identified four elements common to best practice programs that are critical to implementing parent involvement strategies and practices effectively:

1. Strategic Planning

School districts and communities should have a strategic planning framework that builds and sustains parents' involvement with their children's education and with their children's schools. The team recommends the research-based planning model developed by Dr. Joyce Epstein of the Center on Family, School, and Community Partnerships at Johns Hopkins University. The South Carolina School Improvement Council at the University of South Carolina's College of Education provide fee-based training to schools that choose to use Epstein's framework.

2. Legislative Action

Parent involvement activities should be a priority of public schools, and this priority should be reflected in statutes and regulations that govern schools. In 2000, South Carolina's General Assembly enacted the Parental Involvement in Their Children's Education Act. The Act's features are a model for the nation. However, the legislature has not funded the measure

fully, as lawmakers enacted the legislation during a year of extensive state budget cuts. The team recommended full funding for the Act to provide educator training, changes in administrator expectations, and evaluation of the effect of the Act.

3. Dissemination of Best Practices

Education professionals should give communities, agencies, and schools information on best practices and encourage their implementation. There are many examples of parent involvement best practices in South Carolina and across the nation. These programs are most successful when program leaders work to develop strong community support. The report lists examples of best practices for increasing parent involvement with their children's education or with their children's schools. These approaches may be school-based, employer-based, or community-based.

4. Leadership

The team's research found that parent involvement could be most effective where government, education, business, and community leadership is strong. The team also found that leadership affects the overall level of parent involvement in a school more than any other factor by creating a culture that values partnerships among educators, parents, and students. The report recommends specific actions for government, educators, businesses, the community, and parents themselves. These leadership recommendations are based on three core principles: education is valued, our children are job number one, and volunteerism is essential to success.

Document Analysis Summary

To ascertain the state of South Carolina's expectations concerning the role and responsibilities of parents of rural middle school students, the investigator reviewed two

documents. The studied school district's Parent Involvement Policy listed five principles agreed upon by all stakeholders, including but not limited to parents, education leaders, and teachers. The Parent Involvement Work Team of the South Carolina Council on Competitiveness, Education and Workforce Development Task Force identified four elements needed to implement programs effectively, seeking to increase parent involvement. None of the parent participants were aware of the report created by the Task Force. Four of the study participants read the Parent Involvement Policy. The other six parent participants were not sure if they ever received it.

Summary

Chapter IV contained the actual findings of the research study that emerged from the data acquired through face-to-face interviews, an online platform questionnaire, and document review. Ten participants completed the online interview questionnaire and four participated in face-to-face interviews. Participants offered candid responses based on their perceptions. The researcher discovered three emergent themes from the face-to-face interviews and three themes from online platform responses. Additionally, the researcher reviewed two types of documents relating to the parental involvement in education. Chapter V comprises the interpretations of the findings, literature comparisons, conclusions, implications and recommendation for practice and future research.

CHAPTER 5

DISCUSSION, CONCLUSIONS, IMPLICATIONS, and RECOMMENDATIONS

Introduction

This study explored parent perceptions of their role in mathematics learning in rural middle schools in South Carolina. Chapter I provided a foundational synopsis and purpose for the study; Chapter II offered a review of the literature; Chapter III explained the rationale for choosing a qualitative phenomenological methodology, and Chapter IV revealed the findings of the research. Chapter V presents a discussion of findings, conclusions connected to the research questions, implications of the study, and concludes with recommendations for practice and future research studies.

Discussion

Face-to-face, and online interviews were utilized for the purpose of collecting data. Findings from the study yielded matters for discussion involving parent perceptions of their role in mathematics learning. Likewise, the researcher analyzed relevant documents concerning parental involvement. These methods of data collection assisted the researcher in triangulating the data to bring durable validity to the study (Patton, 2002).

Each parent contributed detailed responses to the face-to-face interview questions and online interviews. Six themes emerged from the inquiry:

a) Connection Between Reading Comprehension and Mathematics,
b) Minimal Understanding of Math Curriculum Yields Limited Engagement,
c) Parental Involvement in Mathematics Defined by Student Understanding,
d) Limit Knowledge of New Math Curriculum,

e) Linking the Role Between Parent and Teacher, and

f) Assistant Learning at Home Extends Past Homework.

Fourteen parents participated in this investigation. This study encompassed the following demographic indicators: ten African American females and four African American males. The ages of the participants ranged from thirty-one to fifty-six. Eight of the participants' family status is married parents/guardians and the other six are single parents/guardians. Participants included a math teacher, physical education teacher, social studies teacher, banker, therapist, an assistant principal, Federal Emergency Management Agency contracting specialist, English language arts teacher, United Postal Service intake specialist, retired military sergeant, a restaurant hostess, nursing student, assistant superintendent, and an assistant principal. All are parents of middle schools students in a rural middle school, and were involved in communicating their perception of their involvement in their child learning mathematics.

Theoretical Connections

Epstein's School-Family-Community Partnership Model is an influential model in parental involvement research (Hernandez, 2011). However, an extension of the model, Epstein's School-Family-Community Partnership in the Middle Grades was the overarching framework for this study. Freudenthal's theory of Realistic Mathematics Education and Brofenbrenner's Biocological Model of Human Development were the subsidiary theories.

Epstein's School-Family-Community Partnership Model emphasizes the connection between the family, the school, and the community, with the child being at the center (Epstein, 2005). Children interact with, influence, and are influenced by their families, their schools, and their communities (Epstein, 1995). Parents create *school-like* families by acknowledging the importance of school and school-related activities while encouraging their child's academic

achievement (Epstein et al.., 2009). Epstein identified six essential types of involvement between schools, families, and the community (Epstein et al., 2009). The first type of involvement is parenting. It includes helping families with effective parenting skills, encouraging home conditions to support children in the educational process, and assisting schools to understand families. Findings pointed to the document analysis of the parental involvement policy, Increasing Parent Involvement in Education: A Resource Guide for South Carolina Communities, and ten of the parents acknowledging the need for help concerning their involvement in their child's mathematics learning.

The parent involvement policy was implemented after acknowledging that the lack of parental involvement had a major impact on the achievement levels of many of their students. The division set the plan in motion not only to establish expectations, but also to provide a description of parental involvement. Increasing Parent Involvement in Education: A Resource Guide for South Carolina Communities identified four elements common to best practice programs that are critical to effectively implementing parent involvement strategies and practices. Programs included but were not limited to those that assisted schools in understanding the culture of the communities they served. Family support programs, parent education workshops, and home visits are a few activities that may strengthen the relationship between the community and schools, assist with effective parenting skills and improve the home conditions that support the educational process (Epstein, 2001).

Parent 4 declared, "Schools should offer various sessions after school for struggling students and parents. The students get the help they need and the parent is taught how to help their children at home. I am not aware how to help my child with the math that they are learning now. It is pretty tough and my child struggles and it is hard on a parent to see that and not be

able to do anything to help them." This statement illustrated the need for certain activities suggested by the Resource Guide. Epstein (2001, as cited in Herrel, 2011) affirmed it is imperative for education institutions to collect information from families to help educators understand students and their families, including their backgrounds, goals, strengths, and needs. Parent 1, 2, 9, and 13 expressed that schools should implement learning math activities that involved both the parent and student.

Brofenbrenner's Bioecological Model of Human Development views a child's development within the context of the system of relationships that form their environment (Krishnan, 2010). The theory defines multifaceted layers of the environment that has an impact on a child's progress and growth. The collaboration of the child's maturing biology and his immediate family (parents) environment steers their development (Krishnan, 2010).

The four layers of the Brofenbrenner's model are as follows: microsystem, mesosystem, exosystem and the macrosystem. Mesosystems connect two or more systems in which child and parent live. Mesosystems provide the connection between the structures of the child's microsystem. For example, the connection between the child's teacher and his parents, between his church and his neighborhood, each represent mesosystems. All parents that participated in the study expressed the importance of the relationship between their child's math teacher and themselves. Considering parents and teachers as partners indicates mutual effort toward reaching a shared goal, such as student achievement. It also involves shared responsibility of parents and teachers in encouraging student academic success (Christenson & Sheridan, 2011). In reference, Parent 2 stated, "The teacher should demonstrate problem solving and guide student to understanding concepts and operations so, they can do the work independently and to be able to figure out the next steps to solve problems. The teacher should always model making

connections. As a parent, I will also try to make the connections at home, if I can. We have to make it happen together."

Freudenthal's Theory of Realistic Mathematics Education is an instructional design theory grounded in the belief that students' formal mathematics skills can be developed by engaging in mathematical activities that will progressively expand students' common sense (Johnson, 2013). Math activity should involve subject matter that comes from students' perception of reality (Barnes, 2005). Parents encouraging students to use mathematics in real-world situations at home allow the student to think on a more intuitive level. Parent 3 acknowledged that math learning outside of school is done often by allowing the student to engage in activities such as balancing their budget for the month, hence, expanding basic math skills by involving the student in activities that affect them directly.

Conclusions

The findings of this study yielded answers to the research questions that channeled the researcher's investigation. This section presents the conclusions.

RQ 1: What is the role of the parent in assisting and developing mathematical learning in a rural public middle school in South Carolina?

How well a student performed in mathematics determined the role of the parent. The interview responses revealed that parents admitted to a lack of involvement as long as their child met their grade expectations. Parent 13 conceded, "I think my role in math is to be fully involved but I know I am not involved as I should be. My child does not ask for help with his math homework because he does it in the afterschool program. He holds a B average in math, so I see no need to bother him about his performance in his math class. Now, when I check his

grade begins to fall, then I am asking questions to see why he is not performing and we go from there." This parent believed that her level of involvement was effective because her child was performing well. Parent 2 understood his involvement to be a little bit deeper as he made sure the child grasped the concept being taught, not only by checking her grades but also by asking her questions on the topic.

Parent 13 believed that when the child needed help, it was her job to be more involved by seeking out help for her son. Likewise, Parent 8 also believed the same thing and stated, "My job is to make sure they do well in math class and if they are struggling, I make sure they receive the help they need. If I know how to do the math concept, then I help them but that has been rare since they have been in middle school." Parent 4 saw herself as a helper in times of need. If the child had questions, she was available. Although, Parent 4 made herself available, she did not ask any questions related to math class and was only interested when the child had concerns. Parents also admitted to limiting their involvement due to the lack of understanding the current math curriculum.

Parent 13 also stated, "When my child was younger and learning the basics, I was fully engaged to make sure he understood it. I understood it. I felt like a more involved mother then. Well, a more helpful one. I am not good in math. And the new math curriculum is much tougher than what I learned in middle school and that wasn't that long ago." These parents see their involvement as sufficient if their child is doing well in math class, and a significant amount admit to their involvement being limited by a lack of understanding the math concepts. Although the engagement is contingent based upon student math achievement, some parents acknowledge the effort to expand their involvement. Parent 14 affirmed, "My role is to get my child over the hump and rough parts. If they need my help because they do not understand their math work, I

help them or I find them someone who can help them. Sometimes my role is to simply sit down with my child and help them figure it out. We do it together. She is pretty good in math, so I have rarely help with math homework and she does well on tests." The two themes relating to this question, minimal understanding of math curriculum yields limited engagement and parental involvement in mathematics defined by student understanding, were highlighted by the interview responses and revealed how parents perceived their involvement in mathematics learning.

RQ 2: How do parents perceive the role of the teachers in the students' mathematics learning?

Parents saw the role of math teacher as the person who taught the students all math concepts they needed to know in order to be successful in math in and outside the classroom. Parents acknowledge that by sharing the responsibility the teacher and parent act as partners. However, their roles differ as the teacher does his or her part in the classroom and offers any remediation at school when needed, and the parent enforces what is learned in school at home. Parent 2 believed the teacher should be the one demonstrating how to problem solve and guide the student to understanding the concepts and operations, so that the child is able to perform independently.

This parent saw her role as an extension of the teachers, as she tries to make connections at home. Parent 1 stated, "The teacher and I are a team when it comes to making sure my child is learning mathematics. The teacher is the pathway to the student not only learning math, but also seeing it as something more exciting than a class. I take care of the extended learning at home, however, that is after the teacher has delivered the lesson in school. When my child was in elementary school, I was able to teach them some new concepts at home but the math that they

learn in middle school is out of my element. I depend on the teacher to make sure my child is taught how to do it and I make sure they practice at home and get them any outside help they may need."

Parent 3 saw the teacher's role as the same as the parents just within different environment. The teacher does the facilitating at home, while the parent does it at home. However, they both ensure the child knows and understand math in different aspects of life. Although, Parent 4 believed teachers and parents are partners, Parent 4 also recognized that the teacher should introduce the curriculum, facilitate, and be sure to help students when they lack full understanding. Likewise, Parent 12 affirmed, "The teacher's role is to execute lessons that are aligned with the standards and curriculum. The teacher is also responsible for explaining and engaging students in all strategies and skills of math." Parent 9 believed the role of the teacher is to instruct and motivate the students. Additionally, Parent 9 tries to mirror the role of the teacher at home by giving his child practical experiences that allows them to apply what they have learned. The parents acknowledge that the role of the teacher is vital to their students' success, and some parents try to mimic the teacher role at home.

The document analysis revealed the studied state's expectations and description of parental involvement. In the Parent Involvement Policy, one of the principles involves a compact between the school (teachers) and the parents. The compact is to build strong and meaningful relationships between the families and the school. By providing a description of what parent involvement is both parent and teacher are aware of their own roles and how the two must merge in order to ensure the success of the child.

RQ3: How do parents prioritize the importance of math and other academic subjects (i.e., reading, science, and civics)?

Parents ranked the importance of the following subjects: reading/language arts, science, mathematics, and social studies/history. Eighty percent of the parents chose reading/language arts as the most important subject; 71% chose math as the second most important. Science, and social studies, along with history ranked equally. The majority of the parents saw reading as the most important subject. Parent 12 stated, "Reading comprehension and vocabulary is the foundation and basis of all academic content. As a social studies teacher, I see students who struggle simply because they can't read and understand the material. It's not that they aren't able to understand what is being taught. They simply can't read the information that is placed in front of them. I believe it's very sad that many of my students cannot read and I do no understand how they will be able to make it through life not being able to read. How can you fill out an application for a job if you don't know what they are even asking you?" However, Parent 12 acknowledged that one cannot be truly successful in life without knowing and understanding mathematics.

Although, parents see reading as the most important subject they did recognize the importance of mathematics. Likewise, Parent 14 declared, "As a math teacher, I see that many of my students struggle because they cannot read and comprehend the word problems or the directions. And with a more rigorous curriculum, you can't get by on simple computations. That is why I chose mathematics as number two. Some would see this as a shock since I am a math teacher. I definitely understand the importance of math and how important it is in many career fields, such as being a doctor/nurse, an architect, or a scientist. Being number two doesn't mean I don't see the importance. I am math teacher and I use math all the time outside of the

classroom. I just believe that one can survive more with reading skills, then math."

Parent 7 believed that all subjects are equally important in different facets of life, but chose reading as number one because if you can read you can learn information on your own and not have to depend on someone else to fill your head with knowledge. Parent 3 chose reading as the most important, however, he acknowledged the importance of mathematics and how tough it would be to survive daily without it. Parent 6 chose mathematics and explained the reason behind it as money running the world. This parent believed that money is the reason many decisions are made on different levels and believed that it is important to understand how to use money in order to make it through life. Parent 6 chose reading as number two, as the parent has come in contact with a few people who lack reading skills but understand numbers and how they work.

Implications for Practice

Limited and Minimal Knowledge of the New Mathematics Reform

Parents in this inquiry expressed how their engagement is restricted due to limited knowledge of the latest mathematics reform. Due to this lack of capacity to help their children with the content subject matter, many parents are not comfortable engaging in any activities related to mathematics. In addition, parents expressed the need to know more about the current curriculum and strategies to use to help their student. Graue and Smith (1996) found that parental involvement was an effective ways of changing schools, but merely informing parents about new practices was not enough. Peressini (1998, as cited in Roberts, 2015) suggests that the mathematics education community has not provided parents a formal arena to voice their interests and values. He stated the following,

> Because parents are not knowledgeable of their school's mathematics education, parents do not have any ownership of the reform agenda that is being implemented. Instead, they are forced to try to make sense of their children's mathematics education, and in this process they find that the new programs do not seem to match their own experiences with school mathematics. (Peressini, 1998, as cited in Roberts, 2015)

As the majority of the nation has adopted some manner of mathematics reform curriculum, examining parents' resistance to the new curriculum becomes vital in improving parental involvement and support of school mathematics reforms (Roberts, 2015). Parent 4 and 9 both voiced the need for schools to offer help with mathematics education not just for the students but for parents as well. Possibly, the school district can require individual learning institutions to offer effective math workshops to assist parents with becoming more familiar with the math curriculum. In addition, the district should offer workshops that provide parents with effective methods and strategies to use to help increase student achievement.

Assisted Learning is not Impartial to Homework

Most of the parents alluded to the fact that they assist their child in homework. In addition, the parents established other learning activities to assist in the transfer of mathematic knowledge. An extensively studied area of parental involvement relates to homework. Although the advantages and disadvantages of homework have been discussed and debated among professionals in education and psychology, there is substantial and growing evidence to support the practice of homework as an effective supplement to in-school learning (e.g., Trautwein, 2007), particularly at the middle and secondary school levels. Parents 3 and 10 referred to homework as the type of activities done at home to support mathematics learning.

Patall, Cooper, and Robinson (2008) suggested that different types of parental

involvement in homework might have different relationships to student achievement. Since, parents lack knowledge on which type of parental involvement is more effective in helping with homework, maybe the district could offer math homework trainings throughout the school year. These trainings should offer strategies and skills, which parents can use to aid students with homework.

Correlation between Reading Comprehension and Mathematics

In this study, parents notably emphasized that reading comprehension is the foundation of other academic subjects. Reading and math have multiple commonalities. They are both abstract, symbolic, cognitive processes and they both require some working knowledge of discrete skills (Fite, 2012). However, many students who score well on reading and computational skills tests do not score well on tests of mathematical problem solving. This happens due to the incorrect assumption that students transfer sills used in reading stories to reading word problems. Perhaps, school districts can address this assumption in a parent academic workshop that addresses the relationship amongst the different academic subjects.

Relationship between Parent and Teacher

A number of parents suggested that their role is to assist facilitate and supplement from the teacher's delivery of mathematics in the classroom. Viewing parents and teachers as "partners" is a communal effort toward a shared goal. It also implies shared responsibility of parents and teachers for supporting students as learners (Christenson & Sheridan, 2011). Many of the parents expressed their responsibility to support what the teacher was doing at school but can find it difficult when they lack understanding of the material and how to help. The school district can require that teachers communicate weekly with parents concerning how they can help support the teacher in the classroom. Possibly, correspondences can be sent home on a bi-weekly basis as a means to keep parents informed of concepts covered in the classroom.

Recommendation for Future Research

The following recommendations are offered for related research in the field of parental involvement and mathematics:

1. Due to the fact that this study explored parental involvement in mathematics learning in South Carolina rural middle schools, a continued investigation in other rural school districts in other states, may add to the literature.
2. A comparative study of parental involvement in mathematics learning in urban and rural middle schools may be beneficial to the field.
3. A comparative study of parental involvement in mathematics learning in elementary and middle schools may add to the understanding of the trend.
4. A comparative study of parental involvement in mathematics learning in middle and high schools may be valuable to the research.

Summary

This study offered a qualitative perspective on parent perceptions of parental involvement in mathematics learning. The study was conducted in rural South Carolina school districts. Snowball sampling of rural middle school math parents was used. Findings of this study revealed how parents perceive their role in mathematics learning.

With the challenge to increase mathematics achievement, it is imperative to understand how parental involvement affects this endeavor. Due to the small amount of parental involvement, the researcher employed the snowball sampling method to recruit parents who met the requirements of the study. The lack of parental involvement is an issue shared by school

systems across the nation, and any attempt to encourage parents to become more involved will include identifying the disconnect between how parents and educators perceive their involvement as it relates to academic achievement. Furthermore, by gaining a parental perspective of their definition of parental involvement, specifically in mathematics, school districts can begin to connect mathematics education to effective parental involvement, with hopes of increasing student achievement.

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APPENDICES

APPENDIX A

Approved Institutional Review Board Form

HAMPTON UNIVERSITY
HAMPTON, VIRGINIA 23668

IRB #:

INSTITUTIONAL REVIEW BOARD (IRB) APPROVAL FORM

Title of Proposed Research:
Project/Thesis/Course: Mathematics Education in Rural Middle Schools: Parent Perceptions of Their Role in Mathematics Learning

Investigator(s): Austrai Bradley

Department/Area: School of Liberal Arts – Ph.D., Educational Management

Austrai Bradley 1/11/17
Signature (Investigator) Date

Dr Stephanie OB Johnson 1/11/17
Signature (Instructor or Advisor) Date

Signature (Department Chair) 1/11/17
Date

Signature (Dean/Area Administrator) Date 11-13-17

The investigator has certified that the potential risk is outweighed by the expected benefits and adequate steps have been taken to assure the protection of human subjects.

IRB Action: Approved X Disapproved _____

Dr. Abiodun Adibi, Ph.D.
Chairperson

Date of IRB Action: 1-25-2017

A written review on the involvement of human subjects in this research is required at the times given below. No changes can be made in this research activity without prior written approval by IRB. All unanticipated risks to human subjects should be reported immediately to the Chairperson of the IRB.

Frequency of Required Review Annual X Other _____

Comments: IRB # 20170106

APPROVED
JAN 25 2017
IRB
HAMPTON UNIVERSITY

APPENDIX B

Institutional Review Board Supporting Document

Hampton University School of Liberal Arts, Educational Management

HAMPTON UNIVERSITY
THE STANDARD OF EXCELLENCE

CONSENT LETTER

My name is Austrai Bradley and I am a doctoral candidate in the Educational Management Ph.D. program at Hampton University in Hampton, Virginia. I am conducting research on parents perceptions as part of my dissertation entitled, "Mathematics Education in Rural Middle Schools: Parent Perceptions of Their Role in Mathematics Learning."

The purpose of the study is to gain insight on the parent's perception of their involvement in student's mathematics learning. I invite you to participate in this study because you are a parent/guardian of a middle school math student.

DISCLOSURE:
I understand that I will be asked to participate in surveys and one-on-one interviews. I understand that the survey and one-on-one interviews have no foreseeable risks to the participants. I understand that if I choose to participate, I cannot answer or omit questions. I understand that all information given is strictly confidential to the extent allowed by law and identified only with a subject code number. My name will not appear on any of results. No individual responses will be reported. All information obtained will be destroyed by (DATE).

If you have any question or concerns, please feel free to contact me, Austrai Bradley at 803-369-4073 or raedawnb@gmail.com. I thank you in advance for your time and cooperation.

Consent is only valid if the chair of the Hampton University IRB has signed it. Dr. Abiodun Adibi, Chair of the Hampton University Institutional Review Board, is the legal contact, and can be reached at 727-727-5017 or abiodun.adibi@hamptonu.edu.

I have read and understand this consent form.

_____
Subject (print name)

_____ _____
Subject (Signature) Date

Discuss any inducements, such as money or gifts, used for participation:

There will not be any inducements, such as money or gifts, used for participation in the study.

APPROVED
JAN 25 2017
IRB
HAMPTON UNIVERSITY

APPENDIX C

Letter of Introduction to Parents

Dear Parent,

I am a doctoral student at Hampton University in the program of Educational Management. As part of the requirements for completing the doctoral program, I am currently conducting a research study about the perceptions of parents regarding parental involvement in mathematics learning.

Your principal has stated that, as a highly involved parent, you may be willing to participate in the interview process. All interviews will be private and confidential. Participants ***will not*** be identified at any time during or after the study. Likewise, information gained through the interview will be coded to ensure that each participant remains anonymous.

Participation in this research study is voluntary. You may refuse to participate. By completing the survey, you are indicating your willingness to participate in this study. Surveys will be completely confidential and anonymous.

Your participation will help identify effective parental involvement activities and enhance practices employed by schools to engage parents in the education of their children, specifically in mathematics.

Interviews should last approximately 30-45 minutes and will be conducted at a site to be agreed upon by the participant and the interviewer. I am including a copy of the interview guide for your review. If you have any questions or prefer not to participate, please call me at 803-369-4073. You may also email me a raedawnb@gmail.com.

I will call within two weeks of the date of this letter to schedule an interview if you agree to participate.

Thank you for your consideration.

Sincerely,

Austrai Bradley
Hampton University
Educational Management Doctoral Candidate

APPENDIX D

Permission Letter

School of Success
Academy Charter M.S.

Building Essential Skills for Tomorrow

Hampton Graduate College,

Austrai Bradley has permission to use the Parent Perception Mathematics Survey. If you have any questions please feel free to contact me at:

Phone: 904-573-0880

Email: hillk@sosjax.org

Thank you,

Kaye Hill

Director of Human Resource

CURRICULUM VITA

AUSTRAI R. BRADLEY

EDUCATION:

Doctor of Philosophy, Educational Management, August 2017
Hampton University, Hampton, VA
Dissertation Title: *Mathematics Education in Rural Middle Schools: Parent Perceptions of Their Role in Mathematics Learning*

Master of Education, Classroom Leadership, May 2012
Southern Wesleyan University, Central, SC

Bachelor of Arts, Middle Grades Education, Math & Science, December 2008
University of South Carolina Upstate, Spartanburg, SC
Cum Laude

EXPERIENCE:

August 2015- Present, Academic Director
School of Success Academy
Jacksonville, FL

- Facilitate the intellectual and professional development of teachers with a focus on improving student achievement, while creating positive relationships with teachers and administrators.
- Communicate and demonstrate researched-based instructional practices that result in increased student performance
- React to change productively and handle other tasks as assigned. Provide individualized, classroom-based coaching with participants to support them in implementing good instructional practices.
- Conduct trainings on integrating technology effectively in the classroom.
- Use data to drive instruction, program implementation and teacher evaluation.
- Use critical thinking and problem solving techniques to define problems and identify solutions as well as empowering others and distributing leadership when appropriate.

August 2014- June 2015, Math Coach/Middle School Lead
Global Outreach Charter Academy
Jacksonville, FL

- Researched and provided information and guidance regarding a range of effective and innovative math practices through various activities such as: individual discussions (informal and formal),

coaching sessions, demonstration lessons with pre- and post- discussion/analysis, study groups, staff meetings, and professional development programs.

- Researched and provided staff support that will improve teaching and learning – including: teaching strategies, assessment of math skills, interpretation, and use of assessment results, etc.
- Supervised, disciplined and monitored students, implement and enforce school board policies, administrative rules and regulations, and communicate relevant policies and procedures with regard to student discipline, conduct, and attendance to students, staff, and parents..

August 2010- June 2015, GED Instructor
GED Training
Columbia, SC
Jacksonville, FL

- Effectively trained and taught Adult Learners the concepts needed to successfully pass the General Education Development assessment.

August 2009- Winter 2014, Math Instructor
Hopkins Middle School
Hopkins, SC

- Effectively taught South Carolina's Middle Grade math standards by planning rigorous lessons and engaging activities.
- Effectively implemented SMART Board technology into daily lessons.
- Worked collaboratively with other math teachers to create engaging lessons based on student data.

AWARDS & ACTIVITIES:
Ron McNair Scholar, 2007

COMMUNITY ORGANIZATIONS & ASSOCIATIONS:
Member of Delta Sigma Theta Sorority, Inc. (Secretary)
Jacksonville Alliance of Black School Educators (Secretary)