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The Relationship Between Mathematics Teachers' Perceptions of Student Motivation and their Use of Instructional Strategies for At-Risk Math Students

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This dissertation has been read and approved as fulfilling the partial requirement for the Degree of Doctor of Education in Curriculum and Leadership.

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THE RELATIONSHIP BETWEEN MATHEMATICS TEACHERS' PERCEPTIONS OF STUDENT MOTIVATION AND THEIR USE OF INSTRUCTIONAL STRATEGIES FOR AT-RISK MATH STUDENTS.

by

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ABSTRACT

Student motivation in mathematics education can be affected by many variables, especially for at-risk students. Existing information is limited regarding teacher perceptions of their own pedagogy, instructional strategies, and at-risk student motivation in the area of mathematics for middle school and high school students. The purpose of this study was to analyze middle school and high school mathematics teachers' perceptions of their own pedagogy, instructional strategies, and at-risk students' motivation in mathematics. Deci and Ryan's self-determination theory was the theoretical framework used to guide the current study, which focuses on psychological and instinctive needs of individuals. An explanatory, sequential mixed method design was used to examine data from two separate quantitative surveys and qualitative data gathered from eight one-on-one interviews. Using SPSS analytical computer software, descriptive statistics were obtained. Qualitative data were coded manually by the researcher using in-vivo coding and then again using axial coding. Some of the key findings of the study included participants perceived at-risk students were more motivated in mathematics when the curriculum made connections to students' everyday lives and perceived teacher relationships with students had the greatest impact on student motivation. The results of this study may encourage mathematics teachers to develop relationships with their at-risk students and choose instructional strategies, which may promote at-risk student motivation in mathematics.

TABLE OF CONTENTS

LIST OF TABLES

CHAPTER I

INTRODUCTION

Background of the Problem

Many factors influence student motivation toward learning. There is a large amount of prior research regarding students of low socioeconomic status (SES) and at-risk students' academic achievement (Lacour & Tissington, 2011; Reardon, 2011; Yoshikawa, Aber, & Beardslee, 2012). Low SES and minimal student motivation affect student academic achievement. Of the factors affecting student motivation for students, low SES, teacher attitudes, perceptions, and instructional strategies were examined within the current study. The researcher focused the study on teacher perceptions of at-risk mathematics students and instructional strategies or pedagogy used by teachers who educate at-risk students in mathematics.

Student academic achievement is influenced by many factors, such as gender, race, ethnicity, SES , learning disabilities, long-term health issues, and student self-efficacy (Georgia Partnership for Excellence in Education, 2013; Great Schools Partnership, 2014). Many of these factors correlate to student achievement in academics. However, for the focus of the current study, the researcher analyzed the relationship of low SES and student academic achievement, primarily in mathematics education (Lacour & Tissington, 2011; Reardon, 2011; Yoshikawa et al., 2012). In 2014, approximately 21% of people who are considered to be of low SES were school-aged children who were 18 years old or younger. Of those 21%, nearly 50% of them are African American or

Hispanic (DeNavas-Walt & Proctor, 2015). Living in extreme poverty, single-family households, and/or overcrowded households as a child can lead to experiencing additional stress, slowing mental processes, and decreasing self-control, which can be detrimental as an adult (Blair, Raver, Granger, Mills-Koonce, & Hibel, 2011; Roy & Raver, 2014).

Both poverty rates and graduation rates are continuing to increase across the United States (National Center for Education Statistics, 2015). Federally funded programs, such as the National School Lunch Program (NSLP), which offers students' lunches at a discounted rate or for free, are intervening to assist students with low SES. In 2012, NSLP (2013) reported that at least 31.6 million students were offered free or reduced lunch while at school. Schools with a high number of students living in low SES, referred to as Title 1 schools, can receive additional funds to assist in ensuring all students receive an equitable education (U.S. Department of Education, 2015). Students who are in jeopardy of quitting school early or not successfully completing school on their own are referred to as at-risk students (Georgia Department of Education, 2011; Great Schools Partnership, 2014). There may be a variety of factors, which cause students to become identified as at-risk; however, with the help of Title 1 funding, school systems in the United States are working toward increasing programs and interventions that help at-risk students academically (Georgia Department of Education, 2011; Great Schools Partnership, 2014; U.S. Department of Education, 2015).

In addition to outside factors affecting student learning and success in school, students in the 21st century are experiencing difficulty making connections between curriculums taught in school and real-life situations. After students graduate high school,

there has been some disconnect between the skills and knowledge learned in high school and the skills students need to be successful in college and their careers. Researchers, such as Crockett, Jukes, and Churches (2011) and Fadel (2015), propose redesigning high school curriculum to incorporate these skills needed for 21st century students. However, redesigning curriculum and configuring the appropriate amount of time and age to teach these skills will be very time consuming and challenging (Crockett, Jukes, & Churches, 2011; Fadel, 2015).

The launch of Sputnik in 1957 greatly affected mathematics education by sparking reforms for increased mathematics and science awareness and allowing federal funding to promote these educational reforms (Burris, 2005; Klein, 2003; Woodward, 2004). During the 1960s and 1970s, reformers began to place more emphasis on abstract mathematics concepts at an earlier age but failed to properly train educators beforehand, which caused confusion among educators and students (Woodward, 2004). Later in the 1970s and 1980s, reformers started focusing on the basics of education: reading, writing, and arithmetic. During the 1980s, mathematics reformers concentrated on critical thinking and problem-solving skills (Burris, 2005; Klein, 2003; Woodward, 2004).

In 1989, The National Council of Teachers of Mathematics (NCTM), a group created by educators to ensure the quality of mathematics education, created national mathematics curriculum standards to concentrate on mathematics content and numerical reasoning (NCTM, 2000, 2015). This development inspired the change in the focus of education curriculum to teaching pedagogy. More emphasis was placed on teacher instruction of mathematics content, instead of the content alone. Student goals were created in mathematics education, as well as suggestions for educators regarding

descriptions, qualities, values, and ethics of teaching mathematics (Burris, 2005; Klein, 2003; Woodward, 2004). Mathematics education also shifted toward being equitable for each student, while still maintaining a high level of rigor and depth of understanding (NCTM, 2000).

In 2000, NCTM published an updated set of standards for mathematics. The updated standards were built upon the same focus and morals as the original standards, while revising information to include recent research on technology use and mathematics teaching and learning (NCTM, 2002). The updated standards published in 2000 further developed and restructured the ideas of the 1989 standards by including seven main changes. First, a set of 10standards were created to use across the grades, instead of having a diverse set of standards with specific numbers for each grade level. Second, grade bands were increased from three to four (i.e., Pre-K-2, 3-5, 6-8, and 9-12) to allow more emphasis on the middle and elementary grades. Third, suggestions were added for preschool children learning mathematics. Fourth, an additional standard was added to describe the method and product produced after obtaining and establishing mathematical concepts graphically, symbolically, mentally, and using tangible materials. Fifth, principles were added to the standards as a decision-making guide, which define specific characteristics of a quality mathematics education. Sixth, substantial research citations were added to accompany the changes and additions to the standards. Lastly, NCTM published both print and electronic copies of the standards, along with electronic examples (NCTM, 2002).

Research findings support the NCTM (2000) recommendations, in which students need to be able to relate mathematics curriculum to their everyday lives and be able to

apply the skills and knowledge gained in class to real world situations (Ottmar, Decker, Cameron, Curby, & Rimm-Kaufman, 2014). These connections may be related to students' personal interests and culture, or to society and economics issues relevant to students (Ottmar et al., 2014; Yoshino, 2012). Students' belief and confidence in their own mathematics abilities also impacts their interests, understanding, and demonstration of mathematics curriculum, therein affecting their academic achievement (Straus, 2014).

Student enthusiasm for education and knowledge has been inspired by teachers' methods of instruction, or best practices, used in the classroom and teachers' expectations of students (Petty, Wang, & Harbaugh, 2013; Woolley, Strutchens, Filbert, & Martin, 2010). Çiftçi's (2015) research results indicated that students believe a variety of factors influence a superior mathematics education; however, students identified teacher quality as the most noteworthy and influential factor of mathematics education. In addition to Çiftçi's (2015) research, Park, Gunderson, Tsukayama, Levine, and Beilock (2016) also indicated that student motivation can be influenced by teaching strategies, even for students as early as first and second grade. Teaching strategies and high teacher expectations are also beneficial to boost student motivation for students who believe they are low performers in mathematics. When students believe the teacher has a genuine care for student learning and demonstrates high expectations, students are motivated to try their best, even if they view themselves as low performing in mathematics (Gilbert et al., 2014). Additionally, students whose self-esteem increased, due to teacher quality and teacher strategies, performed better on standardized assessments (Gilbert et al., 2014). Teacher beliefs and teaching strategies, or best practices, are influencing student

motivation, which also affects student academic achievement (Park, Gunderson, Tsukayama, Levine, & Beilock, 2016).

Students interpret teacher's perceptions of their mathematics abilities and begin to view themselves according to the teacher's perceptions. Gilbert et al. (2014) and Yildirim (2012) indicated a heightened desire to learn for students who considered their teachers to be encouraging and compassionate in mathematics. Meaningful and respectful student-teacher relationships, well-informed and open communication, and motivational awareness are beneficial for student learning and student motivation (Yildirim, 2012). In a study regarding remedial mathematics college students, the researcher recommended for teachers to motivate students and identify the students' strengths instead of focusing only on students' weaknesses in mathematics (George, 2012). When teachers held students to a higher standard, exhibited high expectations, and encouraged students to strive for mastery, students revealed greater motivation in learning mathematics (Noble, 2011; Woolley et al., 2010).

Teacher lecture is the most common teaching strategy used in high-poverty high school classrooms, instead of highly engaging and interactive activities (McKinney & Frazier, 2008). Too often, students are not offered opportunities to participate in collaborative learning activities regularly (Jung, 2014). Additional research (Lee, 2012; Sun & Daniel, 2013; Woolley et al., 2010) indicates that instructional strategies, which have been proven to assist in student learning and student motivation, are not being utilized in high poverty schools as often as other schools. Furthermore, Hester (2012) suggested that creating, writing, and reflecting on academic goals helped students in their academic classes. Students who participated in the creation of academic goals, increased

motivation and achieved a significant level of achievement in academics by identifying the significance of mathematics curriculum to situations outside of the classroom environment. These findings suggest that relevant curriculum influences student motivation for learning (Hester, 2012).

According to a study by Sealey and Noyes (2010), students between the ages of 14 and 16 do not see the significance of mathematics and struggle to use mathematics outside of the classroom successfully. Interestingly, the researchers found that mathematics relevancy had different meanings for students, parents, and educators with different SES . Three different opinions of mathematics relevancy were revealed in the study. First, mathematics was viewed as insignificant due to technology and the ease of access to technology. Second, mathematics was considered as a way to learn problem-solving skills across a variety of circumstances. Third, mathematics was perceived important to help acquire employment and secure careers. Sealey and Noyes (2010) also found that the involvement of parents and motivation to learn influenced students to perform well in mathematics.

Students who are identified as low-performing students at an early age will likely remain low performing throughout their educational career and refrain from participation in classroom activities or tasks (Crumpton & Gregory, 2011). In order for these students to be successful in academics, Crumpton and Gregory's (2011) findings suggest these students be offered engaging activities and opportunities to develop pride in their accomplishments. A connection from the content to students' everyday lives is important for low-performing students to help them better understand the importance of the content. Intrinsic motivation, or internal motivation, is another key factor in achieving academic

success for low-performing students. Crumpton and Gregory (2011) found that relevant curriculum combined with intrinsic motivation was correlated with classroom engagement for low-performing students.

Although Crumpton and Gregory (2011) suggested for teachers to offer at-risk and low performing students engaging, interactive activities in mathematics, Prusacyk and Baker (2011) found that in a study regarding kindergarten through eighth-grade school teachers, some of the teachers experience nervousness about teaching mathematics. Mathematics nervousness may prevent teachers from attempting some activities or tasks with students and may also be conveyed to the students, causing students to suffer academically. Prusacyk and Baker recommended that teachers working in high-poverty areas to attend additional professional learning to build confidence in teaching areas, which they experience nervousness. Dogan-Dunlap (2004) found that adjusting instruction for preservice teachers could assist in decreasing nervousness about teaching.

Bonner (2014) identified five teaching traits to influence academic achievement and expand student comprehension in mathematics. Earning trust and building relationships with administrators, parents, and students are identified as the first trait obtained by teachers. Next, frequent communication with students and all involved in students' learning can impact student achievement. Content knowledge and understanding the students are an additional trait for teachers to possess to increase learning in mathematics. Reflection and adjustment to teaching strategies and lessons are another vital trait for teachers who impact academic achievement. Finally, creating a safe and structured learning environment is essential for students to feel welcome and open to

learning mathematics (Bonner, 2014). Furthermore, Bonner (2014) found that culturally sensitive teaching strategies may better assist students who have been identified as low-performing, high poverty students.

Norman (2016) revealed teacher perception also plays an important role in student motivation and achievement. Additionally, Norman (2016) discovered teachers identify with their own viewpoint, race, class, and gender. Moreover, Norman found that teachers view students from high SES and low SES differently. Students enrolled in schools with predominately high SES were believed to be dressed well, have leadership qualities, be supported by their families, and need enrichment opportunities frequently. Unlike students from schools with high SES, students from schools with mostly low SES were believed to have discipline issues and lacked structure, prior knowledge needed to build new concepts, and family support (Norman, 2016).

Researchers (Norman, 2016; Wiesman, 2016) suggested for teachers to identify their own perceptions of students and become more culturally aware of students' needs and beliefs. Wiesman (2016) focused on comparing experienced and new teachers' perceptions of high school students' motivation and identifying teaching strategies utilized within the classroom. The participants were high school teachers from a suburban, middle class school. Both Wiesman (2016) and Norman (2016) found that identifying and utilizing motivational strategies within the classroom may also increase student motivation and academic success. Using a combination of intrinsic and extrinsic motivation strategies has proven to be beneficial for raising student motivation toward learning (Wiesman, 2016).

Moreover, D'Elisa (2015) found that teachers perceived motivation as an important factor in student learning but felt that students have low motivation for learning. Yet, the research results indicated teachers did not want to invest additional time and resources on educating themselves on motivational strategies to incorporate into instruction (D'Elisa, 2015). Having high expectations and standards for students, creating a safe student-centered learning environment, and having confidence as a teacher influences student motivation. Including best practices and research-based teaching strategies, along with culturally sensitive relevant curriculum, enhances student motivation and engagement (Wiesman, 2016).

Statement of the Problem

Student motivation and interest in learning are vital for student achievement in education, especially in mathematics. However, as students get older, interest in learning and motivation decrease, particularly for at-risk students of low SES . While many factors affect student motivation, two important factors affecting student motivation are a lack of relevant curriculum and teacher support and encouragement (Gilbert et al., 2014; Norman, 2016; Park et al., 2016; Wiesman, 2016). Teacher attitude and perception, along with instructional strategies, influence student motivation toward learning (Gilbert et al., 2014; Norman, 2016; Park et al., 2016; Wiesman, 2016). Little information is available regarding teacher perceptions of best practices and instructional strategies, which demonstrate relevance of mathematics education to real-world situations. Studies regarding teacher attitudes and perceptions on instructional strategies that promote student motivation are limited in the area of mathematics for at-risk adolescents. The current study examined teachers' perceptions of how teacher attitudes and instructional

strategies used in mathematics impact at-risk student motivation in mathematics. The results of the study could be beneficial for mathematics teachers, curriculum developers, and preservice teacher education programs for increasing awareness and implementing strategies regarding student motivation in mathematics.

Purpose of the Study

Mathematics teachers, school improvement specialists, curriculum and development specialists, and preservice teacher education program developers are the intended audience and users of the research. Mathematics educators and all individuals involved in educating students can benefit from gaining knowledge regarding student motivation toward learning, specifically learning mathematics. While mathematics education and student achievement remain at a high level of importance in the field of education, understanding student interest in learning and motivation are crucial for increasing student achievement. The results of the study may encourage mathematics teachers to reflect upon current instructional practices and determine strategies, which are best suited for at-risk students. Additionally, teacher preparation programs can benefit from gaining knowledge regarding student motivation and interest for learning. Preservice teachers may gain confidence knowing best practices and instructional strategies utilized to increase student motivation and desire to learn. Teacher attitudes and perceptions may also play a major role in students' self-efficacy. The results of the study may give some insight into how teachers perceive students differently and how teachers perceive themselves as educators.

Research Questions

The current study focused on two factors of teacher involvement in at-risk student motivation: (1) teacher attitude and perception and (2) instructional strategies used in the classroom.

Research Question 1: What are middle and high school teachers' perceptions regarding at-risk students' motivation as it relates to mathematics?

Research Question 2: What strategies do teachers report using for mathematics instruction?

Research Question 3: What are middle and high school teachers' perceptions of their own pedagogy in mathematics as it relates to at-risk students' motivation?

Theoretical Framework

The theoretical framework used to guide the current study was Deci and Ryan's (1985) self-determination theory (SDT), which is a theory of motivation. Deci and Ryan's (1985) SDT focuses on meeting one's intrinsic needs in order to maintain happiness and self-content. Three instinctive and psychological needs of individuals are the center of SDT: autonomy, competence, and relatedness (Deci & Ryan, 1985). One believes a task is more enjoyable when these needs are met and is considered to be intrinsic joy. SDT recommends that if these intrinsic needs are not fulfilled to a preferred amount, the outcome can be harmful for that particular situation (Deci & Ryan, 1985, 1991).

Methodology Overview

The researcher conducted a mixed methods study on teacher perceptions regarding at-risk students' motivation as it relates to mathematics and teacher perceptions

of their own pedagogy in mathematics as it relates to at-risk students' motivation. An explanatory, sequential design (Creswell, 2003) allowed the researcher to gather data both quantitatively and qualitatively. Additionally, the researcher used coding to identify emerging patterns in the data analysis. Two quantitative surveys were used to obtain data regarding at-risk students' motivation toward mathematics and instructional strategies utilized in mathematics classes. SPSS software was used to analyze the quantitative data to determine teacher perceptions of at-risk student motivation in mathematics and instructional strategies used in mathematics classes.

The researcher used a semi-structured interview process as the qualitative data collection method (Hays & Singh, 2012). The researcher determined semi-structured interviews to be the best method of data collection because semi-structured interviews are an exploratory research approach, which can provide in-depth data on the participants' feelings, attitudes, and perceptions toward a certain topic and produce a better understanding into why those perceptions are established (DiCicco-Bloom & Crabtree, 2006; Hays & Singh, 2011; Patton, 1990; Schatz, 2012; Whiting, 2008). The qualitative interviews allowed the researcher to gain a deeper understanding of teacher perceptions through interview questions, body language, and discussion. The data from the interviews were categorized by key terms and overlapping topics. The participants consisted of eight middle school and high school teachers, who were mathematics teachers from a rural South Georgia school district. Data were categorized by grade level currently teaching, years of experience, student motivation factors, and types of pedagogy (Onwuegbuzie, Dickinson, Leech, & Zoran, 2009).

Delimitations and Limitations

Limitations of the study are the relationship between the researcher and the participants, as well as the number of teachers available for the semi-structured interviews. The research was conducted in a rural South Georgia school district, which could be a limitation, too. Teachers within the rural South Georgia school district may not have the same beliefs as teachers from other Georgia school districts. Populations and cultures may vary throughout Georgia school districts and could affect teachers' perceptions of at-risk students and mathematics education. Another limitation may be the relationship between the researcher and the participants as previous co-workers. The researcher's relationship with some of the participants may affect the willingness for participants to feel comfortable providing information for the study to a former colleague. While the pilot study involved former mathematics teachers instead of current mathematics teachers, the amount of time since the former teachers taught mathematics and how mathematics education and instruction has changed from the time when they have taught mathematics, may perhaps be a limitation of the study.

Delimitations of the study are the stratified purposeful participants, who were chosen based on teaching non-gifted students and having the most years of teaching experience. The participants are a mixture of middle school and high school mathematics teachers. Another delimitation could be the sample for the semi-structured interviews. Four participants from the middle school and four participants from the high school with a variety of years of teaching experience were chosen for interviews. The researcher worked within the same school district as the participants; however, the researcher did not work directly with participants in the field of mathematics and taught science during

the time of the current study. Semi-structured interviews allowed the researcher to code data with similar themes that appear among the participants' responses. The participants had experience teaching mathematics and work at the only middle school and high school in the rural district in South Georgia.

Significance of the Study

As a mathematics educator, with experience teaching at-risk students in middle grades and high school mathematics courses, the current study was important to determine teachers' perceptions of methods for which the researcher may utilize to assist future students when learning mathematics. Also, the researcher gained insight into teachers' perceptions of student motivation in mathematics and factors affecting motivation. Often, educators are unaware of how their personal beliefs and perceptions may affect their students. The researcher gained knowledge on motivational strategies and best practices that may be used in mathematics education to help students strive for academic achievement.

Definition of Terms

Terms used through the research are provided here, along with a description of each term. *Academic achievement* is described as students meeting or exceeding academic goals throughout an educational career (Cuseo, n.d.). To determine *poverty*, the U.S. Census Bureau (2013a) analyzes income levels and sets income thresholds, which differ by family size and the constituents of the family. If a family's income is below the threshold determined by the U.S. Census Bureau, then the family is considered to be living in poverty. A family is considered to be living in *profound poverty* if the ratio for the family's income-to-needs was below half of the national poverty threshold. The

income-to-needs ratio is determined by the annual earnings and amount of family members (Roy & Raver, 2014; U.S. Census Bureau, 2013a).

Title 1 federal funding is available for schools and educational agencies with a considerable amount of families who are living in poverty or considered to be of low SES (U.S. Department of Education, 2015). Title 1 funding is money granted from the federal government to assist schools in creating and implementing adequate programs for struggling students. Title 1 funding also aids in supporting financial needs throughout the school day to provide a quality education for all students (U.S. Department of Education, 2015). Students who are considered to be "*at-risk*" are those students who have a greater chance of not achieving success in school, failing, or quitting school. Factors used to determine if a student is at-risk are wide ranging and often involve issues outside of educators' control, such as health issues or SES (Georgia Department of Education, 2011; Great Schools Partnership, 2014).

Skills required for success in college and the workforce for the 21st century are slightly different than those of the 20th century. The *21st century skills* are identified as ethics, action, and accountability, as well as communication, collaboration, analytic thinking, creativity and problem solving (Crockett et al., 2011; Fadel, 2015). Teaching *pedagogy* describes the instructional methods of a teacher, what teachers know about their content area, and what they are able to demonstrate in order to educate students (Burris, 2005; Klein, 2003; NCTM, 2000; Woodward, 2004). *Instructional strategies* are procedures used by educators to assist learners in mastering content knowledge and becoming life-long learners (D'Elisa, 2015; Jung, 2014). Teachers' *best practices* refer to instructional strategies that are proven to be effective and used frequently in the

classroom (Petty et al., 2013; Woolley et al., 2010). Lastly, *self-efficacy* is a term used to describe one's confidence in his or her ability to complete tasks efficiently (Wiesman, 2016).

Summary

As at-risk students of low SES age, the desire to learn and motivation for academic success tend to decrease. Educators strive to motivate students and determine ways to increase students' interest in learning. Although there are many variables that influence student motivation, three variables affecting motivation negatively are a lack of the following: student exposure to engaging and relevant curriculum, effective teaching strategies, and teacher support and encouragement. Research is limited in the area of mathematics for at-risk adolescents pertaining to teacher perceptions of best practices and instructional strategies. The purpose of the current study was to analyze teachers' perceptions of student motivation for at-risk students in mathematics. The results of the study could be beneficial for educators of mathematics, curriculum and instruction specialists, and preservice teacher education program developers. Data were collected using a mixed methods model consisting of surveys and semi-structured interviews conducted with four high school and four middle school mathematics teachers within a rural South Georgia school district.

CHAPTER II

REVIEW OF LITERATURE

Introduction

According to data in the Projections of Education Statistics to 2022 produced by the National Center for Education Statistics (NCES), the number of high school graduates may decrease across the United States by the 2020-2021 school year (Hussar & Bailey, 2013; Swanson, 2010). Educators have been diligently trying to determine how to improve education for all students. Much emphasis and focus has been placed on subjects of weakness, such as mathematics. While analyzing graduation rates and subjects of weakness, educators also analyze proper ways to educate all students effectively (Darling-Hammond, 2010). The purpose of the current study was to determine teacher perceptions of at-risk students' motivation in mathematics education. The study focused on teachers of predominantly low SES students who are enrolled in a Title 1 school in a rural South Georgia community.

Theoretical Framework

Deci and Ryan's (1985) SDT is the theoretical framework used to guide the current study. Deci and Ryan's (1985) SDT is a theory of motivation, which concentrates on reinforcing one's instinctive or intrinsic preferences to conduct one's self in effective and wholesome behaviors. SDT focuses on three psychological and instinctive needs of individuals, which are described in Table 1: competence, autonomy, and relatedness (Deci & Ryan, 1985). The more these needs are fulfilled, the more one recognizes a task

as enjoyable and innate, or intrinsic. Likewise, SDT suggests that if these psychological and innate needs are not experienced, or experienced to a desired extent, the result can be damaging for that particular setting (Deci & Ryan, 1985, 1991).

Table 1

Self-Determination Theory: Psychological and Innate Needs (Deci & Ryan, 1985)

Needs	Description
Competence	Being good at what one does and possess the right skills for a task
Autonomy	Being in control of a situation and makes decisions for themselves
Relatedness	Being connected to others, feeling cared for, enjoying the company one is with and feeling a sense of belonging

Motivation is an important component of the current study, as the researcher investigated teachers' perceptions of student motivation. Motivation, or the reason that inspires a person to act on something, is a widely studied topic (Deci & Ryan, 1985, 2000; Ryan & Deci, 2000). When researching motivation, intrinsic motivation is especially important to assist in determining how to increase desire and effort to be persistent and excel in particular tasks. External reasons for completing a task, such as receiving a grade, evaluation, or some type of reward, often guide people to complete a task. However, people may also be compelled to complete a task because they feel a need from within or they are interested, passionate, or curious about the task. This type of motivation is referred to as intrinsic motivation. SDT focuses on the relationship between extrinsic influences and intrinsic motivations found naturally within people (Deci & Ryan, 1985, 2000; Ryan & Deci, 2000).

SDT directly correlates with the present study as the researcher was interested in gaining knowledge on teachers' perceptions of student motivation (Deci & Ryan, 1985,

2000; Ryan & Deci, 2000). In a traditional classroom setting, tasks are often motivated by extrinsic factors, such as a grade for the assignment or a reward for good behavior. Yet, students may not value those extrinsic elements and may be motivated to complete a task intrinsically. Teachers may struggle when attempting to obtain a completed task from students who do not value the extrinsic elements. At that time, teachers may benefit from knowing what influences students intrinsically (Deci & Ryan, 1985, 2000; Ryan & Deci, 2000).

Review of Literature

Low Socio-economic Status

Numerous factors influence motivation and student academic achievement (Petty et al., 2013). Cuseo (n.d.) described academic achievement as students meeting or exceeding academic goals throughout an educational career. There are a variety of factors that may influence student academic achievement, such as SES , social enticements, the individual and household, and school influences (Petty et al., 2013; Southworth, 2010; Wisconsin Education Association Council, 2014). Educators pay special attention to the factors that can be controlled while students are in school, as many of these factors are outside of educators control (Petty et al., 2013). The Georgia Partnership for Excellence in Education) defines student achievement as a way "to boost individuals' knowledge and increase children's preparedness for future endeavors" (2013, p. 1). The topic of student achievement brings about substantial debate, as there are many considerations to be made regarding the varying levels of performance in different genders, SES, and racial or ethnic groups (Georgia Partnership for Excellence in Education, 2013). Researchers have reported that living in low SES can affect students'

behavioral, emotional, and mental health, which can then impact students' academic achievement (Lacour & Tissington, 2011; Reardon, 2011; Yoshikawa et al., 2012).

Darling-Hammond (2010) reported that throughout the last 20 years, the graduation rate in the United States has decreased to fewer than 70%, while the number of students living in poverty has increased. According to the U.S. Census Bureau's Current Data Reports (DeNavas-Walt & Proctor, 2015) from 2009 to 2012, 34.5% of the general population in the United States had at minimum one experience of living in poverty, which lasted at least two months if not longer. In 2014, the U.S. poverty rate was 14.8%, which was a 2.3 percentage increase from the 2007 poverty rate. A reported 46.7 million people lived in poverty in the United States in 2014. Of people living in poverty in 2014, the percentages categorized by race were as follows: 12.7% Caucasian, 10.1% Caucasian (not Hispanic), 26.2% African American, 12% Asian, and 23.6% Hispanic (any race). Additionally, of people who lived in poverty in 2014, 10% were 65 years of age or older, 13.5% were between the age of 18 and 64, and 21.1% were under the age of 18. Therefore, in 2014, the largest portion of people living in poverty was under the age of 18 (DeNavas-Walt & Proctor, 2015).

Although poverty rates continued to increase in the United States, high school graduation rates experienced some improvement. From 2016 to 2017, high school graduation rates increased slightly from 84% to almost 85%. However, less than 10 states continued to report graduation rates below or at 80%, such as Washington (79%), Oregon (77%), Louisiana (78%), Alaska (78%), and New Mexico (71%). Georgia's graduation rate increased from 73% in 2014 to 81% in 2016. The 2017 U.S. graduation rate percentage categorized by race are as follows: 89% Caucasian, 78% African American,

80% Hispanic, 91% Asian/Pacific Islander, and 72% American Indian/Alaska Native (National Center for Education Statistics, 2019a). In Georgia, there was a 6% difference in the graduation rate between Caucasian (84%) and African American (78%) students (National Center for Education Statistics, 2019b).

The U.S. Census Bureau (2013a) determines poverty by analyzing income levels and setting income thresholds, which fluctuate depending on the size and configuration of the family. If a family's income is below the threshold determined by the U.S. Census Bureau, or the family's needs are greater than the entire family gross income, then the family is living in poverty. A family threshold is an amount of money necessary to provide basic needs for a family and differs depending on the amount of people in the family and the make-up of the family. If the gross family income is below the family determined threshold, then the family is living in poverty. Inability to provide basic needs for everyone in the family, such as shelter, clothing, and food, because of a lack of necessary money is another way to describe poverty (Merriam-Webster, 2017; United Nations Educational, Scientific and Cultural Organization, 2016). According to the Census Bureau Current Population Survey, 46.5 million people in the United States were living in poverty in 2012. Of the people living in poverty, approximately 22% were under the age of 18(The U.S. Census Bureau, 2013b). NSLP is a federally managed program that provides free or reduced lunch for students living in or near poverty. Over 31.6 million students received lunch daily as a result of NSLP in 2012 (The National School Lunch Program, 2013).

Under the Elementary and Secondary Education Act (ESEA), Title 1, Part A (Title 1) financial assistance is provided for schools and other educational agencies with

significant amounts of families and children considered to be living in poverty or low-income. Title 1 offers financial assistance to schools to help create a fair and equitable education for all students, by offering means to additional assistance, such as support programs to assist in the areas of reading and mathematics. Federal funding is determined through formulas using each state's education cost and the census estimated poverty rate for that state. Over 56,000 public schools, approximately 21 million children in the United States benefitted from Title 1 funding in the 2009-2010 school year (U.S. Department of Education, 2015).

At-risk Students

According to the Glossary of Education Reform (Great Schools Partnership, 2014), at-risk students are those students believed to have a greater likelihood of failing or quitting school. The Georgia Department of Education (2011) defines an at-risk student as a student with individual needs that may impede the learning process, achievement in school, or capability to succeed in college or the workforce. The term is used for several different reasons and is situational for each student. Students who are described as at-risk may be in situations or conditions that could endanger their capability to complete school, such as teen pregnancy, domestic violence, homelessness, physical disabilities, severe health issues, low parental income levels, or does not speak English as primarily language. The term at-risk is also used to describe students with learning disabilities, behavior problems, low or failing test scores and grades, attending an inadequate school, or any other learning specific condition that could negatively impact the student's academic achievement (Great Schools Partnership, 2014) At-risk students can benefit from outside assistance with academics, social/emotional behaviors, physical

health, and beyond graduation (Georgia Department of Education, 2011). In short, the term at risk is often used by educators to describe a student who is more likely to fail or drop out of school for academic reasons or outside conditions (Great Schools Partnership, 2014).

The Glossary of Education Reform (Great Schools Partnership, 2014) also stated that traits and behaviors of students typically identified as at-risk are based on measurable patterns and research in student academic performance and demographics. Additionally, the Glossary of Education Reform reported that several research study results indicated relationships among particular risk elements and a student's chance of obtaining academic achievement, high school graduation, and a college degree. Such relationships have increased an assortment of reform plans targeted at recognizing student risk elements and then assisting and supporting those students identified as at-risk in an effort to increase academic achievement and high school graduation. Schools have taken a preemptive approach to identify student risk elements before at-risk students are negatively impacted. Schools have created plans and strategies to utilize for at-risk students to become more academically successful (Great Schools Partnership, 2014). The Georgia Department of Education (2011) has offered students, parents, and communities with wide-ranging collections of supporting interventions and resources to assist students who are at-risk of not achieving academic success. Georgia also offers an Early Intervention Program (EIP) for young students who are in jeopardy of sustaining their current grade level. The EIP was designed to offer extra assistance and interventions for students who were performing below grade level to attain grade level academic skills as quickly as possible (Georgia Department of Education, 2015a).

Impact of Poverty on Achievement

While academic achievement and poverty are widely studied as broad topics, the focus of this research will pertain to the teacher perception of how poverty and low SES impacts mathematics achievement and student motivation, in addition to teacher perceptions and instructional strategies. Several researchers have already conducted studies relating academic achievement among students of low SES to students of high SES and instructional strategies and teaching practices used in mathematics classrooms (Baird, 2012; Garcy, 2013; Petty et al., 2013; Reardon, 2011). Roy and Raver (2014) analyzed how students' long-term school performance was affected by the amount of time the family spent in poverty. The results indicated families who experienced profound poverty with a single parent, profound poverty and an overcrowded home, and substantially stressed families with a single parents diverse risk profiles. Additionally, the researchers found that students who lived in single parent households with high stress levels and students who lived in profound poverty and overcrowded homes during the early years suffered the greatest detriments in adulthood (Roy & Raver, 2014).

Similarly, additional researchers suggested that poverty and poverty-produced stress are commonly connected to higher stress damage to the body, lower mental processes, and weakened self-control in small children. Blair et al. (2011) examined children's level of cortisol to determine stress factors and stress levels related to living in poverty. The higher the child's cortisol level meant the more stress experienced and the more damage to the body over time. According to the research results of Blair et al. (2011), two characteristics of the early setting of poverty were identified in conjunction with higher cortisol levels, (1) the number of adults entering and exiting the home and (2)

the families' doubt of being able to sufficiently meet their economic needs, such as providing medical care, food, clothing, and housing. The effect of the first characteristic identified, the number of adults entering and exiting the home, regularly correlated with a process of allostasis, where stressors cause damage to the body over time. The effect of the second characteristic identified, doubting the ability to provide and meet the family's economic needs, demonstrated higher cortisol levels during infancy and then decreased over time. (Blair et al., 2011).

In a study regarding the opportunity gaps in African American male students, the researcher found that students' interest in learning decreases as students get older and continue through the traditional K-12 school system (Bryan, 2015). In addition to the decrease of African American male students' interest in learning, Fadel's (2015) study on 21st century curriculum found that students in general were also unmotivated to learn and disconnected from the learning process, due to the shortage of real-world connections and relevance within the curriculum and classroom pedagogy. Fadel (2015) also found that increased connections between curricula and students' interests, as well as curricula that were relevant in terms of real-world uses within the economy and society, increased student engagement. Therefore, significant and applicable curriculum that was abstract as well as concrete, increased student engagement (Fadel, 2015).

Furthermore, Crockett et al. (2011) found that students in the 21st century require a different set of skills to be successful in college and the workforce. The following specific skills were identified: (1) problem solving, (2) creativity, (3) analytic thinking, (4) collaboration, (5) communication, and (6) ethics (included with ethics are action and accountability). These six skills were depicted as long-term goals for students, but the

ideal method and time frame for teaching the skills to students is still unclear (Crockett et al., 2011). Fadel (2015) explained the importance of redesigning curriculum to emphasize complex levels of understanding and flexibility to meet the needs of 21st century students.

History of Mathematics Curriculum

The significance of mathematics in education has transformed significantly over the years. Although the content of mathematics has hardly changed, the implementation and importance of mathematics in education has experienced considerable change. Mathematics education was greatly affected in the 1940s by the advancement of atomic weapons and the Soviet Union's launch of Sputnik 1 in 1957. The United States became fearful about falling behind in science and mathematics. In hopes of producing more students, teachers, and mathematicians who would assist the United States compete internationally, federal funds were used to create national reforms in mathematics and science (Burris, 2005; Klein. 2003; Woodward, 2004).

During the 1940s and 1950s, universities, colleges, and professors were also alarmed by the low enrollment in math courses and low level of mathematics skills obtained in the students' K-12 educational career (Woodward, 2004). With the federal funding and new reforms in mathematics education, the "New Math" of the 1960s and 1970s was produced (Burris, 2005). The "New Math" focused on abstract math concepts, language and properties, and proofs. The goal was to familiarize students at an early grade with a formal educational understanding of mathematical concepts and principles and build upon this understanding through the K-12 educational system (Woodward, 2004). This curriculum was unsuccessful in meeting the challenge of expanding the U.S.

mathematical knowledge overall. The "New Math" created confusion among students and teachers, as teachers were not adequately trained on how to provide instruction effectively with this curriculum. The failure of the "New Math" created the Back to Basics movement in the 1970s and 1980s. Back to Basics emphasized reading, writing, and arithmetic (Burris, 2005; Klein, 2003; Woodward, 2004).

In the late 1980s, the new emphasis of mathematics education became critical thinking and problem solving. (Burris, 2005; Klein, 2003; Woodward, 2004). One of the most important publications impacting mathematics education, *A Nation at Risk*, focused on the weakness in mathematics education as well as several other educational issues (U.S. Department of Education, 1999). NCTM, a mathematics education organization organized by mathematics educators, was founded in 1920 to ensure mathematics curriculum development and changes are determined by mathematics teachers instead of politicians and educational reformers (Klein, 2003). As a result of *A Nation at Risk*, NCTM published the documents "An Agenda for Action" and the "Curriculum and Evaluation Standards for School Mathematics" (NCTM, 2002, 2015). The Curriculum and Evaluation Standards for School Mathematics were published in 1989 and contained 13 curriculum standards focusing on both mathematics content and an emphasis on mathematical reasoning as a direct response to the issues in mathematics education. (Burris, 2005; Klein, 2003; NCTM, 2002; Woodward, 2004).

The 1989 NCTM standards were content driven standards for mathematics education. NCTM published Professional Standards for Teaching Mathematics, which support the 1989 standards by including standards for the teaching of mathematics education. This document defined what teachers should know and be able to do as related

to educating students in the field of mathematics (Burris, 2005; Klein, 2003; Woodward, 2004). Next, NCTM released the Assessment Standards for Teaching Mathematics to enforce new testing strategies that would correspond to NCTM's improved plans for mathematics education (NCTM, 2002). In April 2000, NCTM published the Principles and Standards for School Mathematics, which combined Professional standards and Assessment standards, as well as updated the Curriculum and Evaluation Standards (NCTM, 2002). The Principles and Standards for School Mathematics had a major impact on mathematics education due to the substantial goals set forth for students (Burris, 2005; Klein, 2003; Woodward, 2004).

NCTM published *Principles and Standards for School Mathematics* (2000) as a recommendation of characteristics, traits, principles, and standards of teaching mathematics to assist teachers, administrators, and policy makers on how to establish successful mathematics education. There are six principles for mathematics: equity, curriculum, teaching, learning, assessment and technology. Equity describes exhibiting a high level of expectations for each and every student. Curriculum is designed to ensure mathematics is clear and comprehensible, focused on the most important concepts, and connected across each grade level. Teaching mathematics effectively requires an understanding of students, their knowledge, and proper strategies to challenge and support their learning. In addition, students build and retain new knowledge by connecting to prior knowledge and experiences. Mathematics assessments are designed to be meaningful and provide insight to the students' knowledge of the concept. Technology is included in mathematics education to enrich student learning. NCTM (2000) also identified standards for school mathematics to explain mathematical skills, knowledge,

and understanding required for students to be successful in mathematics. NCTM (2000) has five content standards, which contain detailed expectations for students to master: (1) number and operations, (2) algebra, (3) geometry, (4) measurement, and (5) data analysis and probability. Additionally, NCTM (2000) identified five process standards to assist teachers and students to better understand the content standard and how to master the content standards: (1) problem solving, (2) reasoning and proof, (3) communication, (4) connections, and (5) representation.

Furthermore, analytical reasoning, creating, representing, and explaining mathematical problems were included as a component of mathematics curriculum to enhance the depth of student learning in mathematics (NCTM, 2000). Mathematics curriculum was enhanced to generate rational reasoning about math problems and increase student capability of explaining and justifying mathematics work amongst peers. Writing activities were also included in mathematics curriculum to better assist students with reflections regarding their work (NCTM, 2000). In 2014, NCTM published *Principles to Actions* to link research with performance, in response to changes in the national curriculum of mathematics. The principles described by NCTM (2000) are coupled with research-based instructional strategies that NCTM believes to be fundamental for a productive mathematics education program (NCTM, 2014).

Achievement in Mathematics

Ottmar et al. (2014) conducted a study regarding equity and achievement in fifth-grade mathematics education. The study consisted of 5,181 students and analyzed the amount of coverage of mathematics content regarding instructional strategies and student academic success in mathematics in fifth grade. Results indicated that although NCTM

and federal mathematics course standards advocate that teachers adequately distribute mathematics concepts and spend an appropriate amount of time on each concept, these traits did not seem to be taking place in the classroom. Also, research results suggested that including real-world applications, connections to society, economics, personal interests, and experience with a variety of instructional practices in mathematics curriculum may expand understanding in mathematics by offering students chances to connect their learning to situations beyond the classroom (Ottmar et al.,2014).

The Trends in International Mathematics and Science Study (TIMSS) offers dependable and appropriate statistics on the U.S. students' achievement in the areas of mathematics and science associated with the other countries' academic achievement in those areas (NCES, n.d.). Since 1995, data were obtained every four years from fourth-grade and eighth-grade students. TIMSS is operated by NCES, which is part of the U.S. Department of Education and supported by the International Association for the Evaluation of Educational Achievement (NCES, n.d.).

Yoshino (2012) examined the association among eighth-grade students' mathematics self-efficacy and their mathematics assessment results on the 2007 TIMSS. The researcher compared Japanese and U.S. students' mathematics achievement results. The results indicated that for both groups, students' mathematics self-efficacy was positively correlated with their academic achievement. Yet, Japanese students had greater academic achievement but had less mathematics efficacy than U.S. students. The students' mathematics self-efficacy was compared with other factors, such as their parents' highest earned education and the quantity of books in the students' homes. These factors were determined to be positively associated to the students' academic

achievement. The results suggested a relationship between students' mathematics self-efficacy and their country of residence, in addition to a positive correlation among mathematics self-efficacy and mathematics achievement results on the 2007 TIMSS. The researcher recommended considering culture as a factor when planning curriculum, teaching mathematics, and considering students' mathematics self-efficacy. Another recommendation was to consider these cultural differences among Japanese and U.S. students when comparing mathematics achievement and self-efficacy among Caucasian and African American students (Yoshino, 2012).

Similar to TIMSS, the Program for International Student Assessment (PISA) is a global evaluation given every three years to assess 15-year-old students in the areas of mathematics and science, as well as reading and problem solving. PISA also offers an elective assessment in financial literacy. An international organization of developed countries, known as the Organization for Economic Cooperation and Development (OECD), manages PISA while the NCES directs PISA (NCES, n.d.).

Straus (2014) conducted a study using the PISA 2012 mathematics achievement results in relation to SES background and student attitudes toward mathematics for Slovenia compared to Canada, Germany, and the United States. Data for the study were obtained from PISA's student background questionnaires, which accompany the mathematics achievement test. Straus (2014) discovered that although culture and SES continue to influence academic achievement, students' attitudes and confidence in mathematics are greater factors of achievement than their ambition and determination. A pattern appeared among students' replies to the inquiries about their views towards mathematics amongst the four countries involved in the study. Slovene and German

students' responses were comparable, as well as Canadian and United States students' responses. Mathematics achievement test results differed between the four countries, with Canada and Germany having higher results and Slovene and the United States having the lower results. Slovene had the lowest SES and cultural status among the four countries studied and viewed mathematics similar to students from Germany. Throughout the four different countries, the influences between culture and SES with mathematics achievement were largely comparable with the exception of students' attitudes and beliefs towards mathematics having a slightly different influence in Slovenia than in Germany, Canada, and the United States. Straus (2014) recommended to conduct further research concerning the effects of SES, culture, mathematics beliefs, and student motivation on academic achievement.

Motivation in Mathematics

There have been studies regarding relevance to education in general, and more specifically, mathematics education (Gaspard et al., 2015; Hulleman & Harackiewicz, 2015). Recent findings indicate that utilizing classroom interventions and reinforcements had enduring influences on students' viewpoints for mathematics (Gaspard et al., 2015). Student motivation toward education and learning has been influenced by teachers' best practices used in the classroom and teachers' expectations of students. Findings also suggest that students' relationships with teachers can influence students' opinions and beliefs about school and education, which affect student motivation toward academic success (Petty et al., 2013; Woolley et al., 2010). Research in students' perceptions of mathematics education in relation to mathematics achievement indicated that students believe a quality mathematics education includes a combination of elements, such as

school atmosphere, counseling quality, family support, teachers, and teaching practices. Of those elements previously listed, "the teacher quality factor is the most significant and reliable variable in the determination of the mathematics education quality" (Çiftçi, 2015, p. 1497).

In a study regarding first and second-grade students' academic achievement and motivation, research results indicated that teaching strategies influenced student motivation (Park et al., 2016). The focus of the study was to determine at how early of age students' academic achievement are influenced by teaching strategies and student motivation. The study lasted a year and included 424 students and 58 teachers as the participants. The results indicated that students who believe they have low academic abilities and prefer fewer challenging tasks do not perform as well on standardized math assessments as students who believe they are capable of achieving academic success and prefer more challenging tasks. Teacher participants informed researchers about the different teaching strategies utilized in the classroom. The results indicated that motivation for students as young as first and second grade are influenced by teaching strategies used in the classroom. Teaching strategies additionally influenced student academic achievement. Also, the results indicated that first and second-grade students are beginning to view tasks differently and starting to differentiate between challenging and non-challenging academic tasks. Furthermore, teaching strategies and teacher beliefs are influencing student motivation (Park et al., 2016).

Teaching strategies and instructional practices discussed in Principles and Standards for School Mathematics (NCTM, 2000), which concentrate on increasing students' understanding in mathematics and support mathematics curriculum, have been

referred to as reform practices or reform-oriented instructional practices. These practices stress importance of students' comprehension of key concepts and their ability to justify their thinking. Instead of simply solving mathematics problems and writing a correct answer, students participating in reform practices must justify their reasoning and demonstrate their thinking when completing mathematics problems. A correlation exists between increased student motivation and incorporating reform practices within mathematics instruction (Ellis, Malloy, Meece, & Sylvester, 2007; Gilbert et al., 2014; Jong, Pedulla, Reagan, Salomon-Fernandez, & Cochran-Smith, 2010; Le, Lockwood, Stecher, Hamilton, & Martinez, 2009).

While researching student motivation and mathematics achievement, Gilbert et al. (2014) found that students who viewed themselves as low performers in mathematics benefitted from using reform practices within the classroom to increase student motivation. The researchers studied the correlation of students' views of their mathematics classroom setting to their achievement and motivation in mathematics. The study consisted of 979 participants, all of whom were middle school students from eastern Alabama. The sample consisted of students from 30 diverse teacher's classrooms among 11 separate schools within six school districts. Of the students who participated in the study, 59% were Caucasian, 33% African American, and 8% Other, while 58% were in the eighth grade, 28% in seventh grade, and 14% in sixth grade. Additionally, 57% of the participants were female, 40% male, and 3% data unavailable for gender identification (Gilbert et al., 2014).

Findings by Gilbert et al. (2014) suggest that student motivation was influenced by their teacher's expectations and how students interpreted and understood those

expectations. The results indicated that students who believed their teachers positively supported them and believed they had a capability to learn mathematics performed better on their mathematics goals. In addition, students' self-esteem in mathematics increased if their teacher used reform practices more frequently. Students who initially had low self-esteem, and who believed their teachers frequently used reform practices, performed better on standardized tests while students who initially had high self-esteem in mathematics did not show a change on standardized tests. The results suggest that reform practices are beneficial for students with low self-esteem in mathematics (Gilbert et al., 2014).

In a Turkish study regarding teacher support and student achievement, Yıldırım (2012) found that the way students perceive teacher support influences how students perceive their own mathematics ability. The reason for the study was to analyze motivation regarding beliefs about teacher support, the use of teaching strategies, and student academic achievement. Findings revealed that students' belief about teacher support was strongly correlated to using learning strategies in mathematics, which increased students' opinion about their mathematics skills and abilities to further learn mathematics and lowered their mathematics anxiety. In addition, the researcher found that differences among SES were a strong predictor of how students view their skills, ability, anxiety, and achievement in mathematics. According to the research results, students who believed they have supportive teachers tended to have an increased interest in learning. Yıldırım (2012) suggested that engaging student-teacher relationships are beneficial for student learning. The findings highlight the significance of teachers who express knowledge through powerful communication skills and teachers who are

conscious of motivational importance for students. Additionally, varying academic tasks will encourage motivated students to continue learning and give opportunities for students to be creative while learning. Lastly, the findings indicated a need for offering sufficient supplies and resources for schools with predominately low SES students to establish positive learning environments, which promote student motivation, student self-efficacy, and lessen the gap among student achievement (Yıldırım, 2012).

In Boaler's (2015) book, *Mathematical Mindsets*, she investigated how acquiring a mathematical mindset can have a positive influence on achievement while also altering negative beliefs in regards mathematical capability. The researcher suggests modifying the format in which mathematics education is taught in schools to include more engaging and innovative lessons in attempt to increase the desire to learn mathematics and a positive attitude towards mathematics education. Boaler (2008, 2010, 2015) acknowledges that many students and often parents have a negative view about mathematics education. Number talks is one type of teaching strategy suggested by the researcher (Boaler, 2015) to increase fluency in mathematics through a short, everyday problem-solving approach, while creating a growth mathematical mindset. Traditional mathematics teaching strategies, such as numerous worksheets, time-consuming homework, and repeated testing, are aiding in fostering negative mathematics mindsets, instead of creating a growth mathematical mindset (Boaler, 2008, 2015).

George (2012) researched student motivation in remedial college mathematics courses. Remedial students are often identified as students who tend to be depicted by an underprivileged upbringing and below average education. Also, there is a possibility that these students did not have support from educators or family members regarding their

learning throughout their educational career. The researcher suggested that instructors of remedial students focus on improving students' outlook toward academics and learning in general rather than focus solely on their mathematics inability (George, 2012).

Woolley et al. (2010) conducted research and analyzed data related to 933 African American students' mathematics success during middle school. The findings indicated that students demonstrated greater motivation to understand mathematics when presented with higher expectations and standards from teachers. Additionally, student motivation increased as mathematics anxiety levels decreased, and students gained confidence in their mathematics skills. Furthermore, the findings indicated teacher perceptions, practice, and beliefs about student success in mathematics are partially influenced by student motivation (Woolley et al., 2010).

Noble (2011) interviewed African American males who performed extremely well in mathematics and analyzed characteristics of their self-efficacy and values in relation to their motivation in education. The participants shared a mutual goal of attaining academic success due to their knowledge of their own capabilities, even though the participants had a variety of experiences shaping their educational career. The researcher recommended that teachers encourage young students, especially African American males, to work diligently in mathematics and strive for mastery. Teachers also need to be mindful of cultural variances, or differences in behaviors that exist among different cultures, that may be present within a classroom setting and address these issues accordingly. Finally, the researcher recommended more African American males to become teachers and role models to younger students struggling with academic success and self-efficacy (Noble, 2011).

Mathematics Relevancy

McKinney and Frazier (2008) revealed that several instructional strategies were incorporated in mathematics classrooms; however, the most common type of instruction in high-poverty schools was mainly teacher-directed instruction, where teachers are usually positioned in the front of the classroom presenting information to the whole class at one time. Lee, Robinson, and Sebastian (2012) conducted a study in Chicago, Illinois' urban high schools regarding the quality of instruction among different academic subjects. Research results indicated low student engagement in high school classes, especially in mathematics and science courses. Most of the students spent most of their class time in teacher-directed classrooms and was not offered engaging, interactive learning activities consistently. Lee et al. (2012) mention that although the research did not establish a connection between instruction and student achievement, the research was based on prior knowledge from previous researchers that have already stated a connection between instruction and student achievement. Lee et al. (2012) suggested for teachers to offer more interactive learning opportunities in the classroom. Additionally, Jung (2014) researched different mathematics instructional strategies in kindergarten classes. The researcher compared teaching strategies frequently employed in mathematics classrooms to students' mathematical abilities. Using concrete manipulatives as a visual representation was related to students' average growth in mathematics achievement by the end of kindergarten. Students in the sample with lower SES identified more with interpersonal approaches, such as working with partners or in groups. Using a linguistic approach, such as counting aloud or calendar time, was not beneficial for African American students in the sample. Results revealed that students in classes with teachers

who used an instructional strategy, such as counting manipulatives, geometric manipulatives, and mathematics-related games, learned more during kindergarten. These research results revealed that that teacher's instructional strategy was connected to students' learning in mathematics. The researchers suggested for kindergarten teachers to vary instructional strategies and consider students' background, interests, and mathematical abilities when determining instructional strategies for mathematics education. Jung (2014) advocated the practice of using stories, songs, and rhymes, while also allowing students to move their bodies as strategies for teaching kindergartners mathematics. Allowing students to use their fingers to count and perform simple operations can also be beneficial. Jung (2014) also suggests using concrete manipulatives, which offer a visual interpretation of the mathematical problem.

Battey (2013) researched teaching practices and useful mathematics teaching for students in poverty. Battey found that researchers typically describe effective teachers as teachers who maintain content knowledge and utilize instructional strategies to further comprehension within the mathematics classroom. However, these qualities of effective teachers are not as common in high poverty schools (Lee, 2012; Sun & Daniel, 2013). Additional research results suggested a strong correlation between best practices designed to enhance learning, known as reform-oriented practices, and student success in mathematics. This correlation was due in part to the growth of student motivation in mathematics through developing and enhancing mathematics skills by means of instruction provided by reform-oriented practices (Woolley et al., 2010). Reform-oriented practices incorporate instructional practices, mostly instructional practices related to mathematics education reform attempts (NCTM, 2000), which have been indicated to be

positively related with students' motivation. Reform-oriented practices (NCTM, 2000) in mathematics involved skilled and experienced teachers who incorporated instruction with evaluation, academic policies, which developed and improved student learning, available technology for classrooms, and a dedication to a fair, quality education for all students.

Hester's (2012) study focused on student motivation regarding students' personal and future goals. The researcher facilitated in a high school math classroom and assisted students with the development of personal and future goals in mathematics. The researcher then analyzed if developing goals affected how students perceived the course and their academic achievement in mathematics. Although all students in a traditional Algebra II class were invited to participate in the study, only 15students participated. Ten of the 15participants were minority students, with seven females and eight males. The participants were asked to complete brief, additional assignments during a customary algebra II unit. To complete the assignments, students identified personal and future goals for mathematics, created sub goals to increase achievement on the personal and future goals created, and reflected on the connection between their goals and their mathematics class. The results indicated that the production, formation, and reflection of personal, future, and sub-goals benefitted students academically. Additionally, students gained motivation and attained a greater degree of achievement by understanding the relevance of mathematics curriculum to their everyday lives. Most of the students interviewed at the end of the study believed mathematics education was relevant to their future and connected to their everyday lives. Therefore, Hester (2012) found that relevant curriculum impacted student motivation to learn.

Sealey and Noyes (2010) gathered data from the Geographies of Mathematical Attainment and Participation (GMAP) project, which is a complex, mixed methods analysis investigation of mathematics success and participation patterns by geographical location. GMAP also examines how relatives, peers, educators and schools affect these patterns in mathematics achievement. The researchers focused on data from 2004 through 2008 in the National Pupil Database concerning 16-year old and 18-year old students who live in the Midlands of England. The researchers also analyzed surveys of students in Grades 7, 11, and 12 and a sample of mathematics teachers who taught students between the ages of 11 and 18 from 16 schools in the Midland area and created focus groups to interview at three different schools. The focus of the study was to explore the relevance of mathematics education in relation to school context/climate, teacher pedagogy and culture, and student interpretation of relevance.

After investigating the data, Sealey and Noyes (2010) found that students within 14 and 16 years of age did not see the importance of mathematics nor understood how to use mathematics outside the traditional classroom setting. Students in the study did not find mathematics education relevant and could not apply their learning to real-world situations. In addition, the researchers found that relevance had different meanings for teachers and students from different SES (Sealey & Noyes, 2010). The research study consisted of students from three different schools and their interpretation of mathematics relevancy. For students from one school, mathematics relevancy meant using mathematics in their everyday lives. However, they viewed learning mathematics as having minimal importance because of technology applications available to assist with mathematics, which affected the teaching strategies utilized within the curriculum.

Students from the second school in the study interpreted mathematics relevance in terms of obtaining problem solving skills, which could be used in a variety of situations and contexts. According to the researchers, this particular school practiced teaching mathematics through acquiring mathematical reasoning, demonstrating problem solving skills and exhibiting mathematics expectations. Lastly, students at the third school interpreted mathematics relevancy as important for employment and career security. Researchers found that parental involvement, motivation, and control influenced students to perform well in science and mathematics (Sealey & Noyes, 2010).

A study by Crumpton and Gregory (2011) on academic relevancy suggested that students who traditionally are low performing or have low achievement need to be engaged in activities within the classroom and have concern for their work to achieve academic success. The study analyzed academic relevancy, intrinsic motivation, and academic achievement as components that assist at-risk students to engage in learning. The researchers found that students who are low performing at an early age typically remain low performing throughout high school and are more likely to be disengaged in classroom participation and tasks. Crumpton and Gregory (2011) research findings suggested teachers should make connections between the curriculum and real-world situations and relate to the students' everyday lives to promote classroom engagement. Deci, Vallerand, Pelletier, and Ryan (1991) found that students who are motivated and self-driven will produce desired outcomes both personally and educationally. Deci et al. (1991) also found that teachers and parents can offer support to students' interests and keep students intrinsically motivated while learning. The results of Crumpton and Gregory (2011) indicated one way to increase low-achieving students' motivation and

academic success is to make learning and the curriculum relevant to the learner and find ways to motivate students intrinsically, which corresponds to Deci et al. (1991) findings regarding student motivation. The results also revealed that relevant curriculum and internal motivation were related to increased classroom engagement for low-achieving high school students. The researchers recommended further research to be conducted on the extent of the relationship between academic relevancy and student engagement (Crumpton & Gregory, 2011).

Teacher Beliefs and Pedagogy

Some teachers of mathematics may be uncomfortable in exploring mathematics at a deeper level, both personally and professionally. Prusacyk and Baker (2011) stated that some teachers experience nervousness about mathematics, which hinders them from reaching their full potential while teaching mathematics. Prusacyk and Baker's (2011) research focused on teachers of kindergarten through eighth grade. The researchers also noted that this mathematics nervousness can be transferred to the students and may limit students from retaining the mathematics content (Prusacyk & Baker, 2011). Researchers suggested that mathematics educators employed in high-poverty districts participate in more official learning activities than educators in low-poverty districts (Akiba 2012). Dogan-Dunlap (2004) found that educating preservice teachers by method of an integrated approach, rather than traditional instruction, positively altered the preservice teachers' perceptions and attitudes regarding mathematics education. The participants of the study were primarily Hispanic women enrolled in a four-year university in the southwest. The preservice teaching program traditionally required the participants to complete two education courses on teaching mathematics and one mathematics course

focusing on mathematics content. The researchers indicated a need for further research in this area (Dogan-Dunlap, 2004).

Bonner (2014) conducted a study regarding best practices of mathematics teachers who were effective teaching students from a low SES background, ethnic minorities, and low performing on high-stakes testing. Bonner's research focused on "culturally responsive mathematics teaching (CRMT)" and aimed to expand research toward closing the achievement gap in mathematics education (Bonner, 2014, p. 377). Bonner's research was guided by other researchers who studied CRMT and closely aligned to Ladson-Billings (1994) study. The Bonner study (2014) focused on "observable exchanges and the ways in which these interactions construct individual realities" (p. 380) and based the research upon the symbolic interaction theoretical framework of Blumer (1969). Symbolic interactionist (Blumer, 1969) viewed social interactions within the classroom as if each person involved was playing a specific cultural role. Communications in the classroom are a combination of cultural and social interactions where objects have different symbolic meanings for each culture (Blumer, 1969).

As a method to collect data, Bonner (2014) utilized a grounded theory approach. Data were collected and analyzed from three different mathematics teachers' classrooms. All three classrooms were represented in a different setting with different teachers, but each classroom consisted of majority students from a low SES background, ethnic minorities, and low performing on high-stakes testing. Bonner's objective was to analyze the best practices and teaching strategies utilized within these classroom settings. The three participants had varied teaching styles and approached learning differently. The participants were chosen by researcher involvement in community events and through

conversations and feedback with community professionals with connections to the schools. Bonner held community meetings and asked for input regarding successful mathematics teachers and student success. These meetings allowed the community members to make judgments regarding successful teachers within their community and eliminated biases from the researcher in identifying participants. The three participants chosen were all female and taught mathematics, but in different settings, grade levels, and schools. Bonner observed each participant in the classroom setting over a period of time and collected qualitative data through individual interviews with the participants (Bonner, 2014).

Bonner (2014) analyzed the data collected from the study and looked for overlapping emerging themes among the different settings. The results of Bonner's study indicated that teachers who possess the following five characteristics can have a large impact on student academic achievement and knowledge gain in mathematics. First, teachers must build relationships and gain trust with students, parents, and administrators. Secondly, teachers must communicate frequently with everyone involved in the students' learning, especially the student. Third, teachers must be knowledgeable about the content and students they are teaching. Fourth, teachers must reflect and revise often, to have a better understanding of which strategies or best practices were successful for student learning. Lastly, teachers must utilize pedagogy to create a safe, yet structured, learning environment (Bonner, 2014).

Bonner's (2014) research and findings raised questions regarding mathematics instruction to students who are low performing on high-stakes testing and from a low SES background or ethnic minority. The results indicated that leading strategies and best

practices, which are currently in place in the field of mathematics, may not be best for each student, and additional research is needed in this area. Bonner suggests for teachers of mathematics who are pursuing to be more culturally aware, to first acquire information about the student population and communicate in a way closely connected to the students' culture. Bonner also suggests that mathematics teachers need to focus on relationships and relationship building with students who are from diverse backgrounds, as relationships are fundamental to CRMT (Bonner, 2014).

Impact of Teacher Perceptions

Teacher attitude and perceptions toward students also impact student motivation toward learning. Norman (2016) examined teacher perceptions of students of low and high SES. Norman (2016) suggested teachers become familiar with their own viewpoint, identify their perceptions, and adjust personal perceptions during professional development, to ensure equity for all students. The results of Norman's (2016) study indicated that teacher's upbringing, class, gender, and race shaped their view and belief of what was accepted and viewed as normal. Moreover, teacher's opinions indicated parent involvement as a major factor in student academic achievement. Teachers viewed students within high SES schools as having continuous need for enhancement, leadership skills, ample parental support, and minimal discipline issues. Unlike teachers' views of students within high SES schools, teachers viewed students within low SES schools as needing foundational skills, opportunities to gain knowledge, additional parental support, and structure to decrease discipline issues (Norman, 2016).

As students get older, their interests in their own education declines (Bryan, 2015). Therefore, researchers suggest teachers need to practice using motivational

strategies within the classroom to help motivate students to learn. After conducting a study regarding beginner and veteran high school teachers' perception of student motivation in an affluent suburban high school in Chicago, Illinois, Wiesman (2016) recommended teachers determine their own beliefs about student motivation before implementing motivational strategies in the classroom. Although teachers felt passionately regarding their personal beliefs of successful motivational techniques, those techniques are not always applied in a way that really motivates students (Wiesman, 2012, 2016). Research results indicated that both beginner and veteran teachers had similar opinions about student motivation and effective strategies to increase student motivation (Wiesman, 2016).

Effective teachers should have great anticipations for themselves and their students, challenge students without irritating them, and generate a classroom atmosphere where students are enthusiastic participants (Wiesman, 2016). If teachers are not creating an engaging and challenging atmosphere where students desire to learn, then some students may not attempt to achieve to their full potential (Wiesman, 2016). Additionally, research results (Wiesman, 2016) indicated that engaging students and relating content to real-world situations assisted in increasing student motivation. Therefore, the research results suggested for preservice teaching programs and mentoring programs for teachers to address student motivation and provide information on how to promote student motivation (Wiesman, 2016).

Additionally, Wiesman (2016) found that extrinsic incentives were somewhat more significant to students than intrinsic aspirations. Teachers also perceived that receiving verbal praise along with good, passing grades in the classroom encourages

student motivation. Beginner and veteran teachers believed that self-efficacy was an important component of individual student motivation; however, they perceived collaborative work settings did not promote student motivation. Teachers who believed in themselves, held high expectations for students, and created a student focused classroom environment promoted student motivation. By incorporating research-based strategies and making the curriculum relevant, student motivation and engagement increased (Kong & Orosco, 2016; Wiesman, 2016). To further the current study, Wiesman (2016) recommended future researchers to focus on the teacher perceptions of motivation concerning variables connected to motivation, such as SES , gender, or ethnicity. In addition, Wiesman (2016) suggested conducting a similar study in a different school setting, which may generate different results.

For the current study, the researcher examined one area Bonner (2014) recommended for further research. The researcher examined teacher perceptions of instructional strategies of chosen mathematics teachers within a Title 1 school district. To extend some aspects of Bonner's (2014), Norman's (2016), and Sealey and Noyes' (2010) study, the researcher also examined the teacher perceptions of instructional strategies that increase the relevance of mathematics and the impact toward student motivation of learning. The researcher built on the findings of Wiesman (2016) and similarly focus on adolescents. However, the researcher concentrated on teacher perceptions of student motivation for remedial students in mathematics. Unlike Wiesman's (2016) study, the current study took place in a predominantly low SES community, and teachers experiences in remedial mathematics were surveyed and interviewed, to gather information about at-risk students and mathematics education.

In efforts to increase student motivation, academic success, and accountability, researchers have investigated best practices and teaching strategies that may benefit students in mathematics (Firmender, Gavin, & McCoach, 2014). The relationship between two specific instructional practices and mathematics achievement were analyzed in a study on kindergarten and Grades 1 and 2 curriculum. The results indicated a positive relationship between the two variables. Involving students in spoken communication and promoting the routine use of suitable mathematical vocabulary are the two instructional techniques that the researchers incorporated into the mathematics curriculum. These findings indicated that engaging students in oral communication and encouraging frequent use of mathematical vocabulary may possibly be valuable to students' academic achievement in mathematics (Firmender et al., 2014).

In D'Elisa's (2015) study of student motivation, the researcher analyzed teacher perceptions, beliefs, and practices. The researcher surveyed 206 teachers from 13 different states on their opinion of student motivation, techniques for motivating students, and theoretical views and practices. The participants taught different grade levels and subject areas, ranging from kindergarten to 12th grade mathematics, science, reading, English, foreign language, social studies, art, music, technology, business, health, physical education, and special education. Study results indicated that teachers perceived motivation as a significant factor of teaching, even though teachers had diverse theoretical views and instructional practices. Additionally, results indicated that students who teachers perceived to have low motivation do not find curriculum and education relevant to their everyday lives. Interestingly, teachers viewed motivation as an important

component of academic success but did not want to spend additional time learning about motivational strategies to use in the classroom (D'Elisa, 2015).

D'Elisa (2015) suggested future researchers should determine which instructional strategies teachers are utilizing in their teaching and their justifications for selecting those instructional strategies. Generally, teachers considered students to be motivated. Yet, the correlations amongst teacher perceptions and beliefs, and their actual use of instructional strategies for motivation were unsubstantiated and justify further investigation (D'Elisa, 2015). In the current study, the researcher analyzed teacher perceptions about at-risk students' motivation regarding mathematics, specifically. Also, the researcher expanded on D'Elisa's (2015) study and analyze teachers' perceptions on instructional strategies used for at-risk student motivation in mathematics education.

Concept Analysis Charts

Low SES Status/At-risk Students

Study	Purpose	Participant	Design/Analysis	Outcomes
Petty et al. (2013)	Explore which of these factors (student behaviors and student, teacher, and school characteristics) have an impact on student mathematics achievement.	64,980 Algebra II students from 358 North Carolina schools	Quantitative: Studies of variance models were assessed for disparities and a Three-level Hierarchical Linear Modeling technique was used to study predictors of student achievement in mathematics.	Major differences were found among students with different ethnicities, SES, and parental education levels. Gender was not found as a factor. Teacher-level variables studied were statistically meaningful, effecting student success in mathematics. School size and SES were not found to notably increase student success.

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Low SES Status/At-risk Students (continued)

Southworth (2010)	Investigate the effects of school-level qualities on North Carolina students' reading and mathematics accomplishments from Grades 4 through 8, while concentrating on the affiliations between accomplishments and the racial and poverty configuration of schools.	North Carolina students	Quantitative: Hierarchical linear regression studies of students' math and reading End of Grade (EOG) scores in fourth, sixth, and eighth grades in North Carolina.	Academic success is affected by the racial and poverty make-up of the schools that students attend during their primary school years. Added income that high poverty schools obtain is likely not enough to enhance success in those schools.
Lacour & Tissington (2011)	Explore the effects of poverty on academic achievement.	Used sources from other studies	Quantitative	Poverty drastically affects the resources accessible to students. Students of poverty strive to reach higher academic achievement levels. To attempt to close the achievement gap, instructional strategies can be implemented to provide students with needed assistance in order to be successful in academics.
DeNavas-Walt & Proctor (2015)	Examine income and poverty in the United States in 2014.	2014 CPS ASEC sample of 30,000 addresses eligible	Quantitative: U.S. Census Bureau data	2014 average (median) household salary was very similar to the 2013 average (median). The official poverty rate in 2014 was very similar to the 2013 poverty rate.

Student Academic Achievement

Study	Purpose	Participant	Design/Analysis	Outcomes
Baird (2012)	Investigate achievement gaps between low and high SES students.	68,765 8th graders' TIMSS math scores in 200		Students identified with indicators of high SES are over one standard deviation above students with low SES indicators on their mathematics scores.
Garcy (2013)	To link health insurance coverage status to student health and student health to mathematics Achievement.	A sample of Arizona public school students who experienced an illness or injury and whose health insurance coverage status was known	longitudinal math achievement trajectory of students	Irregular health insurance coverage, indicates a shortage in mathematics success over time.
Petty et al. (2013)	Explore which of these factors (i.e., student behaviors and student, teacher, and school characteristics) have an impact on student mathematics achievement.	64,980 algebra II students from 358 North Carolina schools	Quantitative: Studies of variance models were assessed for disparities and a Three-level Hierarchical Linear Modeling technique was used to study predictors of student achievement in mathematics.	Major differences were found among students with different ethnicities, SES, and parental education levels. Gender was not found as a factor. Teacher-level variables studied were statistically meaningful, effecting student success in mathematics. School size and SES were not found to notably increase student success.

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Student Academic Achievement (continued)

Reardon (2011)	Examine whether and how the relationship between family and SES characteristics and academic achievement has changed during the last 50 years.	Participants from 19 other studies	Quantitative: uses data from 19 other studies	The achievement gap between children from high and low income families is about 30% and 40% larger among children born in 2001 than those students born 25 years earlier.
Roy & Raver (2014)	Examine how exposure to deep poverty and poverty-related risks (i.e., single-parent household, residential crowding, caregiver depression, and multiple life stressors) in preschool is related to children's future difficulty in school.	602 children enrolled in Head Start	Qualitative: questionnaires, poverty levels determined by formula calculation	Although patterns of risk are similar across groups (i.e., risks covary in the same way), the prevalence of risk profiles differs. Children who experienced higher levels of risk in preschool had worse school performance than children with low levels of risk. Children who experienced "single and stressed" family settings had more behavior problems than low-risk children while children who experienced "deep poverty and crowded" family settings had worse academic performance.
Blair, et al. (2011)	Examine the relation of early environmental adversity associated with poverty to child resting or basal level of cortisol.	1135 children seen at 7, 15, 24, 35, and 48 months of age	Qualitative: Saliva was collected using cotton or absorbent material. Sample expressed into 2-ml storage vials. Interviews, and home visits were conducted.	Higher cortisol level associated with poor housing quality, African American ethnicity, and low positive caregiving behavior. Adult leavings from the home and perceived economic inadequacy, were related to salivary cortisol levels.

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Student Academic Achievement (continued)

Bryan (2015)	Explore programs and implications for closing African American male students' opportunity gaps.	Analyzed data from other studies	Analyzed data from other studies	One way to increase the academic achievement of urban African American males is by using school family-community partnerships to buffer the negative effects of inequitable access to education.

Curriculum and Achievement

Study	Purpose	Participant	Design/Analysis	Outcomes
Ottmar, et al. (2014)	Study the effects of exposure to mathematics content and instructional practices and the contribution to fifth grade students' mathematics success.	5,181 students, parents, teachers, and trained research assistants	Quantitative: hierarchical linear modeling, questionnaires and mathematics achievement test, administered by trained research assistants.	More exposure to mathematics content past numbers and operations impact student mathematics success. As student exposure increases to more varied mathematics content, the classroom mathematics achievement gap decreases among students in mostly Caucasian classrooms and classrooms of other ethnicities.
Yoshino (2012)	Investigate the relationship between eighth-grade students' mathematics related self-concepts and their achievements in the TIMSS 2007.	183,150 fourth-grade students and 241,613 eighth-grade students	Primarily Quantitative: TIMSS 2007 was used as the data source.	Students' beliefs in their math abilities was clearly associated with their success both in Japan and the United States. Japanese students had higher achievement, but lower beliefs in their math abilities than U.S. students. Parental education, and the number of books at home were also found to be positively related to achievement.

Curriculum and achievement (continued)

Straus (2014)	Examine to what extent students' attitudinal factors additionally explain the relationship between SES background and achievement.	The PISA (2012) data collection included large nationally representative samples of 15-years-old students. 37,434 students total.	Quantitative: PISA assessment data, linear regression analysis	SES background influences student mathematics achievement.

Student Motivation

Study	Purpose	Participant	Design/Analysis	Outcomes
Gaspard et al. (2015)	Examine whether ninth-grade students' value beliefs for mathematics would be enhanced by relevance interventions in the classroom setting.	1,978 students in 82 ninth-grade mathemtics classes	Quantitative: cluster randomized controlled study	Two short reinforcements and 90-min interventions in the classroom had lasting results on students' beliefs of mathematics.
Petty et al. (2013)	Explore which of these factors (i.e., student behaviors and student, teacher, and school characteristics) have an impact on student mathematics achievement.	64,980 algebra II students from 358 North Carolina schools	Quantitative: Studies of variance models were assessed for disparities and a Three-level Hierarchical Linear Modeling technique was used to study predictors of student achievement in mathematics.	Major differences were found among students with different ethnicities, SES, and parental education levels. Gender was not found as a factor. Teacher-level variables studied were statistically meaningful, effecting student success in mathematics. School size and SES were not found to notably increase student success.
Woolley et al. (2010)	Examine the relationship among student perceptions of teacher expectations and reform instructional practices, aspects of	933 African American middle school students	Structural equation modeling Student self-report data and standardized mathematics test scores (SAT-10)	Students who stated their teachers used more reform practices and higher expectations showed more sought-after levels of motivation to learn mathematics.

Student Motivation (continued)

	student motivation, and three students mathematics performance outcomes—time spent studying, expected grade in mathematics, and SAT-10 Math scores.			Teachers who use reform practices and had increased expectations had direct impacts on SAT-10 scores. Also had effects on mathematics outcomes studied through the three features of student motivation.
Çiftçi (2015)	Compare the differences in mathematics anxiety and achievement in secondary school students according to their views of mathematics education. Test the effects of the views of mathematics education quality on anxiety and achievement.	638 secondary school students	Quantitative: The study analyzed data from mathematics grade point average (GPA), the Mathematics Education Quality Scale, the Placement Test (TEOG) the Mathematics Anxiety Assessment Scale.	The findings presented diverse insights of secondary school students concerning the value of mathematics education. These findings also suggested that viewing mathematics education as valuable absolutely affects the mathematics GPA and TEOG, but undesirably influences mathematics anxiety.
Park et al. (2016)	Explore how early students' motivational frameworks (entity vs. incremental) have been linked to academic achievement and how motivational frameworks develop in the first place.	424 students and 58 teachers	Quantitative: A standardized test, a questionnaire adapted from a published study (Gunderson et al., 2013), a questionnaire modified from the Patterns of Adaptive Learning Scales (PALS; Midgley et al., 2000), and the Elementary Number Concepts and Operations subtest of CKT-M (Hill & Ball, 2004).	Children who used an incremental framework performed higher on a nationally normed standardized math test than children who used an entity framework. Teachers' reported that their instructional practices used in the classroom was vital in the progress of students' motivational frameworks.

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Student Motivation (continued)

Gilbert et al. (2014)	Examine the relationship of middle school students' perceptions of their mathematics classroom environment to their motivation and achievement.	979 middle school students	Quantitative: Structural equation modeling and state-assessed standardized test scores (SAT-10)	Motivational variables facilitated the impact of perceived teacher beliefs, teacher encouragement and use of reform practices on mathematics standardized test scores. Students' beliefs that their teachers have faith in them, and they are capable of learning and understanding mathematics certainly relate to their Mastery and Performance Goal. Frequent use of reform practices is especially important for students who view themselves as being less capable in mathematics and who are lower performers.
Ellis et al. (2007)	Examine relationships between instructional practices and student cognitive and social outcomes in middle-school mathematics classes, external observers and students reported perceptions of teachers' instructional practices.	28 classes of 15 teachers	Quantitative: survey of instructional practices	Reasonably strong correlations among ratings of external witnesses and beliefs of sixth-grade students across three dimensions of reform-oriented teaching strategies in mathematics classrooms.

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Student Motivation (continued)

Jong et al. (2010)	Examine the classroom practices of beginning elementary school teachers' instruction of mathematics and how it connected to their pupils' learning.	22 beginning teachers in one large urban school district	Qualitative: The Reformed Teaching Observation Protocol (RTOP- determine the degree to which beginning teachers used reformed teaching practices. As an assessment of pupil learning, the study used assessment scores detailed to the mathematics unit viewed and studied them with teachers' RTOP scores.	Beginning teachers who used reformed teaching practices usually have students who scored higher on the district mathematics test
Le et al. (2009)	Explore the relationship between mathematics and science achievement and reform-oriented teaching over a 3-year period.	7806 6th grade students, 8854 7th grade students, 10498 8th grade students	Quantitative: teacher surveys	More experience with reform-oriented practices was usually not associated with higher student achievement but the results improved with continual use of reform-oriented practices.
Yildirim (2012)	Examine the role of motivational beliefs in mediating the relationship among perceived teacher support, learning strategy use, and student achievement.	4, 855 15-year-old students in Turkey	Quantitative: Programme for International Student Assessment mathematics scores and questionnaire responses via multilevel analysis.	Perceived teacher support was positively related to learning strategy use in mathematics and that this relation was mediated through math self-efficacy, anxiety, intrinsic value, and instrumental value. Between-school SES differences to be strong predictors of math self-efficacy, anxiety, and achievement.

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Student Motivation (continued)

Noble (2011)	Examine the personal stories of African American men who performed well in mathematics to comprehend the effect of their self-efficacy views on their motivation and academic achievement in mathematics at the postsecondary level.	Six African American males between the ages of 18 and23	Qualitative: General analyses of autobiographies and interviews	Enactive achievement and experience were important sources for these African American men's self-efficacy views and were sustained by family, friends, and peers. Experience seemed to be more significant than enactive achievement for these participants. Peers effect the degree of attitudes toward academics for African American men.

Mathematics Relevancy

Study	Purpose	Participant	Design/Analysis	Outcomes
McKinney & Frazier (2008)	Investigate the mathematics pedagogical and instructional skills of in-service teachers who teach in high-poverty middle schools (Grades 6 through 8).	64 in-service teachers	Quantitative: survey	Although the different subject areas are using a variety of instructional practices, teacher-led instruction continues to be used the most in many high-poverty classrooms.
Lee et al. (2012)	Explore the quality of instruction and determine if it's systematically better in one subject than another.	158,000 students, teachers, and principals in Chicago high schools	Quantitative: hierarchical linear models (HLM), surveys	English and social studies classes had a greater quality of instruction than mathematics and science classes. Students' instructional understandings seemed inconsistent.

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Mathematics Relevancy (continued)

Jung (2014)	Study the type of mathematics instruction used by kindergarten teachers and if it is related to children's mathematics knowledge during kindergarten as it relates to the children's SES and race.	Final sample included 3,309 children in 200 U.S. schools. Data used from the Early Childhood Longitudinal Study–Kindergarten Class (ECLS-K) sponsored by the NCES (2001a, 2009).	Quantitative: Studied the influence of teachers' instructional practices by using two-level random intercept and slope model. Analyzed the relationship among instructional practices and end of the year mathematics achievement.	Teacher's instructional strategies were related to children's mathematics knowledge. Kindergarten teachers need to use a variety of instructional strategies that allow for students' multiple skill levels.
Battey (2013)	Examines a case study of one urban classroom of Latino and African American students, where their teacher engages them in substantive mathematics and reform-minded pedagogical strategies.	A Caucasian female teacher and 25 fourth-grade students	Qualitative: video, field notes, and an interview, a case study	Four areas were found in which relational connections facilitated access to mathematics: Addressing culture and language, acknowledging behavior, framing mathematics ability, and acknowledging student contributions
Lee (2012)	Studies the problem of educational insufficiency and inequality for disadvantaged minority students. Examines consistent gaps in important school and teacher resources and mathematics accomplishment by connecting national education data sets.	80,600 students in the NAEP sample, 5,151 students in the full NAEP sample	Quantitative: 2000 NAEP mathematics assessment, 2000 School District Finance Survey and the SASS. Linked the student mathematics achievement from NAEP to teacher qualification scores obtained from the SASS teacher file.	The capability -based gaps are much larger than the fairness - based gaps. Meeting the NAEP Grade 8 mathematics proficiency standard entails considerable rises in per-pupil education spending and the in-field teaching of mathematics national rates.

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Mathematics Relevancy (continued)

Woolley et al. (2010)	Examine the relationship among student perceptions of teacher expectations and reform instructional practices, aspects of student motivation, and three students mathematics performance outcomes—time spent studying, expected grade in mathematics, and SAT-10 Math scores.	933 African American middle school students	Structural equation modeling Student self-report data and standardized mathematics test scores (SAT-10)	Students who stated their teachers used more reform practices and higher expectations showed more sought-after levels of motivation to learn mathematics. Teachers who use reform practices and had increased expectations had direct impacts on SAT-10 scores. Also had effects on mathematics outcomes studied through the three features of student motivation.
Hester (2012)	Focus on students' personal, future goals to explore student motivation.	15 students from one standard algebra II class	Primarily Quantitative: Surveys, Focus Groups, student work	Students benefit from pinpointing their goals, creating sub-goals and considering the process. Students profit by viewing the class and math as significant to their lives, expanding motivation, and appreciating a higher level of success.
Sealey & Noyes (2010)	Explore how different emphases on what might be termed practical, process and/or professional forms of relevance affect the experiences and aspirations of learners of mathematics.	Case study on students from three different schools	Qualitative: Focus groups	Students with comparable mathematical abilities but from diverse schools view the importance of mathematics inversely.

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Mathematics Relevancy (continued)

Crumpton & Gregory (2011)	Explore the effects of academic relevancy on engagement and Achievement.	44 students	Primarily quantitative: Regression analyses on student surveys, student interviews, and school records on students	Students who found coursework personally relevant had increased engagement in Grade 10.

Teacher Beliefs/Pedagogy

Study	Purpose	Participant	Design/Analysis	Outcomes
Akiba (2012)	Examine professional learning activities for middle school math teachers and how teacher qualifications and contextual characteristics are associated with the amount of their professional learning activities. Examine types of formal and Informal professional learning activities.	577 middle school mathematics teachers in Missouri	Quantitative: statewide survey	Middle school mathematics teachers devote the most time in collaborate teacher meetings, professional development programs, and learning events. Teachers in districts with high ethnic diversity and high-poverty usually spend more time involved in official learning events such as teacher collaboration, professional development programs, and mentoring training than mathematics teachers in wealthier and less diverse districts.
Dogan-Dunlap (2004)	Study differences in preservice teachers' perception of mathematics after the use of an Integrated, Collaborative, Field-Based Approach to Teaching and Learning.	Preservice mathematics teachers at universities	Quantitative: survey	Students had noticeable positive changes on their attitude towards and perception of mathematics.

Teacher Beliefs/Pedagogy (continued)

Bonner (2014)	Present findings from an ongoing study focused on deconstructing pedagogical practices of successful mathematics teachers in classrooms with high populations of traditionally underserved students.	Three teachers, each of whom has a distinct teaching style and approach to learning	Qualitative: Grounded theory was utilized to collect and analyze data from three mathematics classrooms in varied settings, each of which was highly populated by traditionally underserved students.	Trust and relationships are essential to culturally responsive mathematics teaching (CRMT), while communication forms and several forms of knowledge facilitate these connections.
Norman (2016)	Explore perceptions of teachers regarding the SES class of both impoverished and advantaged students with whom they worked.	10 middle-class, teachers	Primarily qualitative: surveys, interviews, teacher journals, and researcher journal	Teachers' feelings about students' SES were exposed. Parental involvement as a factor in student's academic growth evolved as a strong belief for all teachers. Teachers did not realize that their beliefs influenced student learning.
Wiesman (2016)	Compare novice and experienced teachers' perceptions of student motivation at the high school level and to determine if the teachers were likely to incorporate research-based techniques.	150 high school teachers from a suburban, middle class school	Quantitative: Survey data collected on the motivational constructs (intrinsic and extrinsic motivation; performance, mastery, and social goal orientation theory; and student self-efficacy)	Novice and experienced teachers generally agreed on the motivational effectiveness of the constructs. Both groups of educators did not always effectively make use of the established motivational principles.

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Teacher Beliefs/Pedagogy (continued)

Firmender et al. (2014)	Study kindergarten, first and second grade mathematics curriculum. Establish if relationships occurred among teachers' use of two specific instructional strategies and students' mathematics success in geometry and measurement.	36 teachers and 601 students who previously participated in the Project M2 curriculum implementation research study as part of the field test intervention groups.	Establish the associations between teachers' use of the instructional strategies and students' mathematics success using hierarchical linear modeling.	Important relationships did exist; teachers' scores for verbal communication and promoting mathematical language learning strategies were indicators of student mathematics success as determined by students' increase in scores on the Open-Response Assessments.
D'Elisa (2015)	Examine teachers' beliefs, perceptions and practices related to student motivation.	206 teachers from 13 states	Quantitative: on-line survey containing the Perception of Student Motivation questionnaire (PSM), Motivating Strategies Questionnaire (MSQ), and researcher-devised questions examining theoretical beliefs and practices	Teachers believe motivation to be a significant part of teaching. Teachers' conveyed feeling successful for identifying and mediating student motivation. Teachers recognized relevance as a cause for students' motivation and suggested their use of strategies correlated to relevance more than other strategies and reasons. Teachers recognized motivation as an essential component of their teaching, but they did not want to receive additional professional training in this area.

Summary

Mathematics achievement is an area of concern for at-risk students in the United States. In the literature, researchers examined multiple factors which impact students' mathematics achievement. Substantial differences were found among students of different cultures, SES, and parental levels of education. Student achievement was directly influenced by the racial and SES configuration of the schools that students attend. Students with indicators of high SES scored more than one standard deviation greater than students with low SES indicators in mathematics. In 2001, the achievement gap among students of low SES and high SES had risen to almost 40% higher than it was in the 1980s.

At-risk students were more successful in mathematics when exposed to mathematics content in a variety of ways and when the content was relevant to students' everyday lives. Students' self-efficacy in mathematics impacted their success in mathematics. When teachers reported the use of reform practices in the classroom along with higher teacher expectations, students displayed more appropriate levels of motivation to learn mathematics. Repeated use of reform practices was significant for students with low self-efficacy in mathematics.

CHAPTER III

METHODOLOGY

Introduction

Students who are in danger of not successfully graduating high school independently are known as at-risk students (Georgia Department of Education, 2011; Great Schools Partnership, 2014). Research results suggested that at-risk students demonstrated low levels of motivation in mathematics courses (George, 2012; Gilbert et al., 2014; Miller, 2000); and as a result, many at-risk students are low performing in mathematics. Researchers suggested teachers' strategies and content pedagogy play an important role in at-risk students' motivation in the classroom (Gilbert et al., 2014; Park et al., 2016). Studies were limited concerning teacher attitudes on instructional strategies in mathematics that supported student motivation for at-risk youth.

In the current study, the researcher focused on mathematics teachers' perceptions of student motivation and instructional strategies used for at-risk math students. The research questions that guided the study were: (1) What are middle and high school teachers' perceptions regarding at-risk students' motivation as it relates to mathematics?; (2) What strategies do teachers report using for mathematics instruction?; and (3) What are middle and high school teachers' perceptions of their own pedagogy in mathematics as it relates to at-risk students' motivation?

The researcher focused on middle school and high school mathematics teachers for the present study. The sample of participants was narrowed by identifying novice and

experienced mathematics teachers. The study took place within a rural South Georgia school district, which had only one middle school and one high school. In 2018, the middle school had a total enrollment of 652 students, with 92.71% of those students receiving free and reduced lunch. The high school had a total enrollment of 791 students, with 92.69% of those students receiving free and reduced lunch.

The researcher conducted an explanatory, sequential mixed methods study (Creswell, 2008) to collect quantitative data followed by qualitative data. Before conducting the study, a pilot study of the survey instrument was administered. Any recommendations from the participants of the pilot study were applied to the survey instrument. Participants completed a survey on teachers' perceptions (Appendix A) and an instructional strategies survey (Appendix B). From the quantitative data gathered, the researcher then narrowed the participant sample through the stratified purposeful sampling method (Patton, 2002). Next, individual interviews were conducted with eight participants. Lastly, qualitative data were obtained from the interviews and analyzed. The survey instruments used aligned with Research Questions 1 and 2, while the interview questions aligned with Research Question 3.

Research Questions

The purpose of the current study was to determine teacher perceptions of at-risk students' motivation in mathematics education and teacher perceptions of their own pedagogy in mathematics education. The current study focused on teachers of predominantly low SES students who were enrolled in a Title 1 school in a rural South Georgia community. The research questions that guided the study were (1) What are middle and high school teachers' perceptions regarding at-risk students' motivation as it

relates to mathematics?; (2) What strategies do teachers report using for mathematics instruction?; and (3) What are middle and high school teachers' perceptions of their own pedagogy in mathematics as it relates to at-risk students' motivation? The survey on teachers' perceptions administered by the researcher addressed Research Question 1 and the instructional strategies survey addressed Research Question 2 regarding types of instructional strategies used in mathematics classes and the frequency of use for each strategy. Research Question 3 was addressed through individual interviews with middle school and high school mathematics teachers.

Research Design

Researchers have argued that one type of research, qualitative or quantitative, is better than the other for various reasons (Hays & Singh, 2012). Qualitative research focuses on the process and understanding of the research topic through data collection methods, such as interviews and observations (Creswell, 2003; Merriam, 2002; Patton, 2002). Quantitative research focuses on the outcome and causes of the research topic through data collection methods, such as surveys and structured observations (Creswell, 2008; Hays & Singh, 2012). Due to the interpretive nature of qualitative research methods, researchers have questioned the reliability of qualitative research (Creswell, 2003, 2008). In addition, researchers have doubted whether the results of quantitative data truly represent what was intended, or the validity of the research (Creswell, 2008; Hays & Singh, 2012).

To have a better understanding of the data and to increase the reliability and validity of the data, researchers have used a combination of both types of methodologies (Hays & Singh, 2012; Miles & Huberman, 1994). Mixed methods research is an approach

that incorporates gathering and evaluating both qualitative and quantitative data within a study to provide a comprehensive view of the research topic (Creswell, 2003; Hays & Singh, 2012; Miles & Huberman, 1994). Using a mixed methods approach can reduce some of the limitations of using quantitative or qualitative methods alone while increasing the understanding of the data results (Creswell, 2008; Hays & Singh, 2012). There are multiple types of mixed methods designs, each specifying the order in which the researcher will collect the qualitative and quantitative data (Creswell, 2008; Hays & Singh, 2012). The research study's design for this investigation of teacher perceptions and strategies used within the classroom was an explanatory, sequential mixed methods design, in which the researcher collected and examined quantitative data from the surveys first, then obtained and analyzed qualitative data from interviews (Creswell, 2008; Spruce & Bol, 2015).

Creswell, Plano Clark, Gutmann, and Hanson (2003) discussed six mixed methods designs in their research. Three of the mixed methods designs were considered by the researcher for the current study. Of those research designs inspected for the study, exploratory, sequential design, concurrent triangulation, and explanatory, sequential design, the researcher determined the mixed methods strategy of explanatory, sequential design to be best for the current study. In an exploratory, sequential mixed methods design, qualitative data are obtained and analyzed from a small group first, and then quantitative data are gathered and evaluated from a larger group to further explore the topic (Creswell et al., 2003). Concurrent triangulation mixed methods design utilizes both quantitative and qualitative data at the same time to reinforce or deepen findings in a specific study (Creswell et al., 2003). Explanatory, sequential mixed methods design

allows the researcher to collect and analyze quantitative data from a larger group first then obtain and examine qualitative data from a smaller group (Creswell et al., 2003). For the present study, the researcher was interested in teacher perceptions of student motivation and their own pedagogy, as well as the use of instructional strategies, with at-risk mathematics students. Therefore, the researcher chose to use the explanatory, sequential design to gather and analyze quantitative data from a survey first then collect and analyze qualitative data provided in interviews.

First, a pilot study was conducted to ensure the validity of the quantitative surveys to be used during the study. The participants of the pilot study were former mathematics teachers who now hold different positions within the school but are still working within the same school district as the study participants. After the completion of the pilot study, the current study began. Both quantitative surveys were administered to eight middle school and eight high school mathematics teachers. The researcher developed and piloted both surveys used in the current study. The purpose of the survey on teachers' perceptions was to collect data from participants concerning their thoughts and experiences with at-risk students. The purpose of the instructional strategies survey was to gain information from the participants regarding the teaching strategies used in their mathematics classroom. Based on the survey data, the researcher further developed questions for individual interviews.

Next, the participants in the sample were narrowed by identifying the years of teaching experience and classes currently teaching, through the stratified purposeful sampling method (Patton, 2002). Then, interviews with open-ended questions were conducted to gain further information regarding teacher perceptions of their own

pedagogy in mathematics. Open-ended interview questions allowed participants to communicate their perception in their own words (Patton, 2002). Qualitative data were gathered from semi-structured interviews of the participants in the smaller sample (Patton, 2002). Common themes emerged after coding keywords and phrases within the participants' responses.

Quantitative data from the survey indicated the teaching strategies utilized within the classroom and teacher perceptions of student motivation in mathematics. However, using this method alone was disregarded because the researcher believed a quantitative method would limit the depth of responses from participants. The researcher utilized the data on teacher perceptions of student motivation and the use of instructional strategies to further develop interview questions. The quantitative survey data could not present the data on teacher emotions regarding their perceptions of their own pedagogy in mathematics as it relates to at-risk students' motivation as well as a more comprehensive, open-ended method (Creswell, 2003; Miles & Huberman, 1994).

Qualitative data gathered from semi-structured interviews gave insight to participants' true perceptions through open-ended questioning (Patton, 2002). Fisher's (2017) research focused on reflective practices of successful fourth-grade mathematics teachers. To obtain in-depth information concerning teachers' reflective thinking strategies, Fisher (2017) used a qualitative method of gathering data through semi-structured, open-ended interview questions. Collecting qualitative data through interviews allowed the researcher to gain more understanding of teacher perceptions, as participants were more comfortable and provided more in-depth responses during open-

ended interviews (Patton, 2002). For these reasons, the researcher decided to use a mixed methods approach by collecting quantitative data first then collecting qualitative data.

The research confirmation table (Table 2) for the study is found below. The table summarized the research questions for the study, how the research questions were measured, and how the research approach answered the research questions.

Table 2

Research Confirmation Table

Research Question	Instrumentation/Analysis	How did strategy answer research question?
(1) What are middle and high school teachers' perceptions regarding at-risk students' motivation as it relates to mathematics?	Perceptions of At-Risk Students' Motivation Survey	Survey results indicated teachers' perceptions of at-risk students' motivation in mathematics
(2) What strategies do teachers report using for mathematics instruction?	Instructional Strategies Survey	Survey data provided the frequency of use for instructional strategies in mathematics
(3) What are middle and high school teachers' perceptions of their own pedagogy in mathematics as it relates to at-risk students' motivation?	Semi-structured Interviews	Interviews with mathematics teachers revealed information regarding teachers' perceptions of their own pedagogy in mathematics as it relates to at-risk students' motivation.

Role of the Researcher

The researcher has a combined nine years of experience teaching mathematics at the middle school and high school level. During those nine years, the researcher taught a diverse group of students, including at-risk students. The researcher gained interest in at-risk students, their motivation to learn mathematics, and teaching strategies utilized in

mathematics classrooms. The researcher served as the interviewer for the semi-structured interviews to direct the discussion toward answering the research questions and support discovery in an open and unrestricted format.

Participants

The current study was conducted in a rural South Georgia school district. Within the school district, there is one primary school (Grades PreK-2), elementary school (Grades 3-5), middle school (Grades 6-8), and high school (Grades 9-12). Overall, 93% of students within the school district received free and reduced lunch (GADOE, 2018b). For the current study, the researcher concentrated on teacher perceptions of middle school and high school mathematics teachers. Therefore, the researcher focused on school context data for the middle school and high school within the district (Table 3).

Table 3

Demographic Information of a Rural School District in South Georgia: Georgia Department of Education (2018a)

Totals	Middle School (Grades 6-8)	High School (Grades 9-12)
Enrollment	652	791
Females	333	412
Males	319	379
African American Students	227	264
Caucasian Students	425	527
African American Females	115	141
Caucasian Females	218	271
African American Males	112	123
Caucasian Males	207	256
Percentage of FRD	92.71%	92.69%

The participants were selected by a method of stratified purposeful sampling, and their identity remained confidential throughout the study. This method of sampling "allows you to demonstrate the distinguishing features of subgroups (or strata) of a phenomenon in which you are interested" (Hays & Singh, 2012, p. 167). The researcher focused on all middle and high school mathematics teachers and then narrowed the sample after administering the survey by identifying the teachers' years of experience and use of instructional strategies. The research questions for the study referred to middle and high school mathematics teachers. Therefore, the participants were middle and high school mathematics teachers in a rural South Georgia school district. All nine middle and nine high school mathematics teachers within the school district were asked to complete the quantitative surveys. A 50% response rate is acceptable for quantitative data (Teddlie & Tashakkori, 2009). With 18 middle and high school mathematics teachers, at least nine teachers needed to respond to the survey instruments to obtain adequate data. Stratified purposeful sampling was utilized as a method of determining participants for the qualitative portion of the current study. Participants were sorted into subgroups based on teaching strategies (i.e., modern versus traditional) and experience with at-risk students. Using the information from the subgroups of teachers by teaching strategies, four teachers from the middle school and four teachers from the high school were selected. Of those teachers selected, two were veteran teachers, and two were novice teachers. The researcher analyzed the sample's years of experience from the demographic information provided on the survey then disaggregated the data to determine numbers of years of experience to classify participants as novice or experienced (Doganay & Ozturk, 2011; Rice, 2010; Wolters, Fan, & Daugherty, 2011). At-risk students benefit from

having experienced teachers who offer engaging lessons and demonstrate compassion for at-risk students (Hansen, 2016; Spivey, 2006).

Instrumentation

Part One of the study consisted of a survey instrument, created by the researcher, which was designed to gather data on teacher's perceptions of at-risk students' motivation. The researcher designed the survey instrument based on information obtained in the literature regarding teacher's perceptions of at-risk students' motivation in mathematics instruction. (D'Elisa, 2015; Gilbert et al., 2014; Norman, 2016; Park et al., 2016; Wiesman, 2016). The researcher aligned the questions in the survey instrument with Research Questions 1 and 2 of the current study. The quantitative item analysis for Perceptions of At-Risk Students' Motivation Survey is described in Table 4. This survey also included demographic information, such as years of teaching experience, highest degree received, and classes currently teaching. The survey was administered online to all middle and high school mathematics teachers in a rural South Georgia school district. The survey collected email addresses of participants, to ensure each participant completed the survey.

The survey used a five-point Likert scale, which determined the degree to which participants agree or disagree with various items associated with a common subject (Teddlie & Tashakkori, 2009). The five point Likert scale is as follows: 5 = *Strongly agree,* 4 = *Agree,* 3 = *Neither agree nor disagree,* 2 = *Disagree,* 1 = *Strongly Disagree*. The researcher used SurveyMonkey to create and administer the survey to participants online. SurveyMonkey is an online survey software that assists researchers in the creation and administration of online surveys. Through SurveyMonkey, the researcher enabled

SSL encryption to ensure that sensitive data were transmitted securely from the participant's computer to the SurveyMonkey servers (SurveyMonkey Inc., 2019). SurveyMonkey allowed the researcher to provide an online consent form on the first page of the survey to guarantee that each participant provided consent before having access to the survey. Additionally, SurveyMonkey recorded the time stamp for each participant's responses (SurveyMonkey Inc., 2019). At the end of the survey, participants were asked to choose a day and time that was best for the researcher to conduct an interview. The responses were returned immediately to the researcher via SurveyMonkey online. Participants' responses were recorded on a spreadsheet. The perceptions of at-risk students' motivation survey and the corresponding coding scale are included in Appendix A.

Part Two of the study was the instructional strategies survey, which required participants to respond by identifying the instructional strategies used in their mathematics class and the frequency of use for each instructional strategy. The quantitative item analysis for the Instructional Strategies Survey is described in Table 5. A five point Likert scale was used to measure the frequency of occurrence for each instructional strategy. The following Likert scale was used: *5 = Always, 4 = Very Often, 3 = Sometimes, 2 = Rarely, 1 = Never*. The responses were returned immediately to the researcher through SurveyMonkey. Participants' responses were recorded on a spreadsheet. The instructional strategies survey and coding scale are included in Appendix B.

Finally, semi-structured interviews were conducted using an interview protocol (Appendix C). The questions designed for the interviews were based upon the literature

obtained by the researcher and aligned to Research Question 3 of the current study. The qualitative item analysis for the Interview Protocol Questions is described in Table 6. After all middle school and high school teachers completed the surveys, the researcher narrowed the sample using information regarding years of experience and instructional strategies used. The researcher used a stratified purposeful sampling method to identify the teacher participants who were and were not teaching gifted education classes and by the teachers' years of teaching experience. The researcher used this information to identify eight participants to interview. Each of the participants received a written request and consent to gain permission to conduct a person-to-person interview with open-ended questions and received a copy of the interview questions. Within the written request, the participants were informed that their identity would remain confidential throughout the study; if they did not feel comfortable answering a question, they had the option to say, "I would rather not answer," and the interviewer would not ask that question again. Also, if participants felt uncomfortable at any point during the interview, they had the right to ask for a break without consequence.

The researcher conducted semi-structured interviews with eight participants. Interviews took place in a conference room at the participants' school of employment with a "Please do not disturb" sign placed on the door. Two tape recorders were used to record the interview and were placed on the table between the researcher and the participant (Hays & Singh, 2012). The researcher used an interview protocol (Appendix C) to assist in the semi-structured interview process. The interview began with an introduction and the researcher described the purpose of the study along with the interview process. Participants were reminded about confidentiality and informed that

they had an opportunity to review the interview afterward. Next, the researcher began asking the pre-determined open-ended questions designed for this interview. During the interview, the researcher asked additional questions that resulted from the participants' responses to the pre-determined questions. In closing, the researcher asked the participant if he/she had any questions for the researcher or would like to add any additional information that was not discussed during the interview.

Table 4

Quantitative Item Analysis for Perceptions of At-Risk Students' Motivation Survey (Appendix A)

Item		Research
1.	Put forth effort to learn new concepts (Effort)	Weisman, 2016; Yildirim, 2012
2.	Unfocused and must be reminded to finish classwork (Participation)	Crumpton & Gregory, 2011; Yildirim, 2012
3.	Engaged in content related tasks (Interest/relevance)	Crumpton & Gregory, 2011; Fadel, 2015; Sealy & Noyes, 2010
4.	Display minimal effort (Effort)	Weisman, 2016; Yildirim, 2012
5.	Motivated if real-world connection (Interest/relevance)	Crumpton & Gregory, 2011; Fadel, 2015; Sealy & Noyes, 2010
6.	Not planning on future education (Ambition)	Hester, 2012; Weisman, 2016
7.	Accepted by their peers (Peer influence)	Noble, 2011; Straus, 2014; Weisman, 2016
8.	Lack the ability to be self-motivated (Motivation)	Crumpton & Gregory, 2011; Deci & Ryan, 1985, 2000; Ryan & Deci, 2000
9.	Confident in academic abilities (Self-esteem)	Gilbert et al., 2014; Weisman, 2016
10.	Try to achieve academic goals (Ambition)	Hester, 2012; Weisman, 2016
11.	Lack support at home (Family life)	Basque & Bouchamma, 2016; Noble, 2011; Norman, 2016; Sealey & Noyes, 2010
12.	Have high self-esteem (Self-esteem)	Gilbert et al., 2014; Weisman, 2016
13.	Parents attend conferences at school (Family life)	Basque & Bouchamma, 2016; Noble, 2011; Norman, 2016; Sealey & Noyes, 2010
14.	Focused and complete classwork (Participation)	Crumpton & Gregory, 2011; Yildirim, 2012

Item		Research
15.	Strive to perform well in front of peers (Peer influence)	Noble, 2011; Straus, 2014; Weisman, 2016
16.	Want to be successful in school (Motivation)	Crumpton & Gregory, 2011; Deci & Ryan, 1985, 2000; Ryan & Deci, 2000
17-21	Participants Demographic Information	

Note. All items align with Research Question 1

Table 5

Quantitative Item Analysis for Instructional Strategies Survey (Appendix B)

Item		Research
1.	Connect to real-world experiences (Interest/Relevance)	Fadel, 2015; Jung, 2014; Ottmar et al., 2014; Sealey & Noyes, 2010
2.	Relate to students' interests (Interest/Relevance)	Fadel, 2015; Jung, 2014; Ottmar et al., 2014; Sealey & Noyes, 2010
3.	Engage in verbal communication (Communication)	Firmender et al., 2014; Kong & Orosco, 2016; NCTM, 2000; Wiesman, 2016
4.	Use appropriate math vocabulary (Communication)	Firmender et al., 2014; Kong & Orosco, 2016; NCTM, 2000
5.	Participate in collaborative learning activities (Collaborative learning)	Crockett et al., 2011; Fadel, 2015; Jung, 2014; Kong & Orosco, 2016
6.	Use concrete manipulatives (Visual representations)	Jung, 2014
7.	Use math related games (Interactive learning)	Jung, 2014
8.	Use songs, stories, and/or rhymes (Interactive learning)	Jung, 2014
9.	Use teacher directed learning (Traditional methods)	Lee et al., 2012; McKinney & Frazier, 2008
10.	Establish learning goals (Planning/Preparation)	Hester, 2012; NCTM, 2000
11.	Provide tasks with reasoning and problem solving (Critical thinking)	Crockett et al., 2011; Fadel, 2015; NCTM, 2000; Sealey & Noyes, 2010
12.	Compare understandings with other students (Collaborative learning)	Kong & Orosco, 2016
13.	Use purposeful questioning (Assessment)	NCTM, 2000
14.	Use technology for teaching (Technology)	Boaler, 2008, 2015; NCTM, 2000

(continues)

Table 5
Quantitative Item Analysis for Instructional Strategies Survey (continued)

15.	Use student data to adjust instruction (Assessment)	Bonner, 2014; NCTM, 2000
16.	Provide feedback (Communication)	Bonner, 2014; Crockett et al., 2011; Kong & Orosco, 2016; Yildirim, 2012
17.	Give homework three times a week (Traditional methods)	Boaler, 2008, 2015
18.	Follow the pacing guide (Planning/Preparation)	Boaler, 2008, 2015
19.	Use textbook as a guide (Planning/Preparation)	Boaler, 2008, 2015
20.	Use movement in the classroom (Interactive learning)	Jung, 2014
21.	Use worksheets (Traditional methods)	Boaler, 2008, 2015; NCTM, 2000
22.	Use graphic organizers (Visual representations)	Boaler, 2008, 2015; NCTM, 2000
23.	Use multiple representations (Critical thinking)	Jung, 2014; NCTM, 2000; Ottmar et al., 2014
24.	Allow students to use technology (Technology)	Boaler, 2008, 2015; NCTM, 2000

Note. All items align with Research Question 2

Table 6

Qualitative Item Analysis for Interview Protocol (Appendix C)

Item		Research
1.	Experience with at-risk students	Crumpton & Gregory, 2011; Weisman, 2016
2.	Experience with motivation in at-risk students	D'Elisa, 2015; George, 2012, Eilbert et al., 2014, Miller, 2000
3.	At-risk students' motivation in mathematics	D'Elisa, 2015; Weisman, 2016
4.	Instructional strategies used in mathematics	Baird, 2012; Garcy, 2013; NCTM, 2000, 2014; Ottmar et al., 2014; Petty et al., 2013; Reardon, 2011
5.	Practice improved motivation in at-risk students	Battey, 2013; Boaler, 2008, 2015; Bonner, 2014; Firmender et al., 2014; Park et al., 2016; Weisman, 2016

(continues)

Table 6

Qualitative Item Analysis for Interview Protocol (continued)

6.	Instructional strategies that increased motivation	Battey, 2013; Boaler, 2008, 2015; Bonner, 2014; Firmender et al., 2014; Park et al., 2016; Weisman, 2016
7.	Advice for new teachers	Dogan-Dunlap, 2004; Hansen, 2016; Spivey, 2006; Weisman, 2016
8.	Additional information	

Note. All items align with Research Question 3

Pilot Study

A pilot study is important to test a new instrument with a small sample of experts, who are not involved in the actual study, to ensure quality of future data collection procedures and detect any complications in the data collection protocol (Teddlie & Tashakkori, 2009). Pilot studies are beneficial for (1) creating and examining the appropriateness of research instruments, (2) evaluating whether the researcher's proposed procedures for using the instrument are workable and practical, (3) finding logistical complications that might arise while administering the instrument, (4) assessing variability in results, (5) gathering preliminary data, and (6) deciding which resources are required to effectively administer the instrument and conduct the study (Van Teijlingen & Hundley, 2001). To assess the validity of the survey instrument used for the current study, a pilot study was completed. The researcher conducted the pilot study to ensure the survey instrument was valid, meaning the instrument measured the intended content. The pilot study was conducted to ensure that the instrument displayed respect for participants and used appropriate terminology that all participants could understand (Teddlie & Tashakkori, 2009). Changes to the Instructional Strategies Survey instrument were

recommended by the pilot study participants. The researcher considered those changes and adjusted the instrument as needed.

The current study was not approved in nearby districts due to the end of the year testing schedule, so the researcher used purposeful sampling of former mathematics teachers within the same district as participants for the pilot study (Patton, 2002). All current middle school and high school mathematics teachers within the district were included in the current study; therefore, the pilot study consisted of former mathematics teachers within the same district. To determine validity of the study, the researcher included participants in the pilot study that closely resembled the participants in the current study (Patton, 2002). Both sets of participants worked within the same district, supported the same vision, and had experience teaching mathematics and at-risk students. The researcher did not include former mathematics teachers who were administrators or retired from teaching because there were not any administrators or retired teachers as participants in the current study. Six former mathematics teachers completed the survey instruments during the pilot study. The participants in the pilot study were still working in education, but are teaching in different content areas or have taken on different roles within the school system (Table 7). Given that the pilot study was conducted within the same district as the current study, and the participants were still working within that district, the participants supported the same vision and mission statement for learning. According to the district's vision, the goal is for students to graduate high school, become productive citizens, and become life-long learners by providing students with a quality education.

The pilot study took place in the same meeting room as the weekly mathematics department meeting, to duplicate the same setting as the current study. The researcher explained the purpose of the pilot study and the directions for the survey instrument. Participants were instructed to write ideas and questions on provided paper regarding the survey instrument, without discussing the instrument aloud with the group. The researcher stepped out of the room for approximately 20 minutes and then returned to the meeting room. A focus group panel discussion then took place among the participants and researcher to review feedback of the survey instrument. The pilot study involved former mathematics teachers instead of current mathematics teachers, a limitation of the study was the amount of time since the former teachers taught mathematics and how mathematics education and instruction has changed since they have taught mathematics.

Table 7, below, displays pilot study participants' information. To preserve the confidentiality of the study participant, the researcher used a code for each participant instead of using their name. Participants years of teaching mathematics experience are listed in the table, in addition to their current role in education. All participants in the pilot study are former mathematics teachers.

Table 7

Pilot Study Participants

Participant Name	Years of Experience	Current Role in Education
1. Teacher A	4	Remedial Mathematics (Middle School Connections)
2. Teacher B	16	Science (Middle School)
3. Teacher C	27	Career Development (Middle School Connections)
4. Teacher D	8	Special Education (High School)

Participant Name	Years of Experience	Current Role in Education
6. Teacher F	25	Remedial Mathematics (Middle/High School Alternative School)

Pilot study participants were given a paper copy of the surveys while they completed the survey online through SurveyMonkey. The paper copy was for participants to write notes or questions that might arise during the pilot study. After participants completed the pilot study, one participant mentioned that the second survey in SurveyMonkey listed answer option (4) as "usually"; however, the paper copy of the survey had option (4) listed as "very often." This change was noted by the researcher and corrected in SurveyMonkey to reflect answer option (4) as "very often" before administering the survey during the current study. A question was asked about the first survey, question 3. The participant wanted clarification on whether the researcher was asking if the work students are doing in class is content related or if students were actually completing work in class, when the work is content related. The researcher clarified that the question was addressing students actually completing content related tasks while in class. No other questions or concerns were addressed from the pilot study participants.

Data Collection

Selecting Participants

The criteria for selecting participants for the pilot study and the current study consisted of including former and current middle school and high school mathematics teachers. The pilot study participants included six former middle and/or high school math teachers. The participants for the current study included nine middle school and nine high school math teachers. Eight of the current study participants completed individual

interviews with the researcher. The researcher worked with all participants in the past and worked within the same school district as participants. The researcher continued to work within the same district as the participants after the study was completed.

Recruitment Procedure and Informed Consent Process

For the pilot study, the researcher approached the perspective pilot study participants in person at the conclusion of the weekly grade level meeting, described the pilot study, and asked for their participation in the pilot study. Weekly grade level meetings were held after school in a classroom. Participants for the pilot study were former middle school and high school mathematics teachers that worked within the district. Pilot study participants were given an electronic consent form at the beginning of the web-based surveys. The electronic consent form at the beginning of the web-based survey included the following information about the pilot study: (1) purpose, (2) procedure, (3) possible risk, (4) potential benefits, (5) cost and compensation, (6) confidentiality, and (7) withdrawal. Pilot study participants selected whether they agreed or disagreed to participate in the pilot study. If they disagreed, the survey would close, and the reply would be documented. If they agreed, participants continued to complete the survey.

For the current study, the researcher attended the weekly mathematics department meetings at the middle school and high school and described the research project and requested participation. Weekly math department meetings took place after school in a classroom. Participants were asked to complete the web-based survey after the conclusion of the weekly mathematics department meeting. At the beginning of the web-based survey was a consent form that included the following information about the current

study: (1) purpose, (2) procedure, (3) possible risk, (4) potential benefits, (5) cost and compensation, (6) confidentiality, and (7) withdrawal. Current study participants selected whether they agreed or disagreed to participate in the current study. If they disagreed, the survey would close, and the reply would be documented. If they agreed, participants continued to complete the survey. After surveys were completed, the researcher asked eight participants in person to complete individual interviews. The researcher chose four participants from the middle school and four from the high school to interview based on the following data from the surveys: years of teaching experience and instructional strategies utilized. The researcher and participant scheduled the interview date and time together. Before the interview began, the participant signed another informed consent form.

Methods

For both the pilot study and current study, surveys took place at the end of the weekly department meeting, which allowed potential participants the choice to leave if they did not want to participate in the study. In the pilot study, participants were in a weekly meeting, but it was not be the same meeting as the participants in the current study. The pilot participants were former mathematics teachers and therefore were teaching something other than mathematics. They attended a weekly meeting for their current content area/grade level. The participants for the current study were in a meeting for current mathematics teachers only.

The researcher provided laptops, snacks, and water for participants, then the researcher described the research and purpose for the pilot study. Participants were given a printout of the survey and asked to take notes while completing the web-based surveys,

but not to discuss the surveys aloud until the researcher returned to the room. To ensure trustworthiness of data, participants were asked to complete the survey without discussing the survey with other participants in the room. Participants had the right to not participate in the study by clicking "do not agree" on the survey. No other participants in the room would know if they did not complete the survey. At the beginning of the web-based survey was a consent form for the pilot study. The participants selected whether they agreed or disagreed to participate in the pilot study. If they disagreed, the survey closed, and the reply was documented. If they agreed, they continued to complete the survey. The survey did not take longer than 30 minutes to complete.

The researcher stepped out of the room for participants to complete the survey and returned to the room after approximately 20 minutes. The researcher returned to the room and conducted a focus group panel discussion among the participants and researcher to review feedback of the survey instrument. Feedback from the pilot study participants was reviewed and changes were made to the survey. One participant shared a concern, and another participant asked a question regarding a survey instrument question. The researcher clarified the information and made changes to the survey instruments. No other questions or concerns were addressed from the pilot study participants.

For the main study, the researcher attended the weekly mathematics department meetings at the middle school and high school, described the current study, and requested participation. Participants were asked to complete surveys after the conclusion of the weekly mathematics department meeting. At the beginning of the web-based survey was a consent form for the current study. The participants selected whether they agreed or disagreed to participate in the current study. If they disagreed, the survey closed, and the

reply was documented. If they agreed, they continued and completed the survey. The survey did not take longer than 30 minutes to complete.

Survey response data were analyzed through SPSS computer software. After surveys were completed, the researcher chose four participants from the middle school and four from the high school to interview based on the following data from the surveys: years of teaching experience and instructional strategies utilized. These eight participants were asked in person to participate in the interviews. The researcher and participant scheduled the interview date and time together.

The researcher conducted semi-structured individual interviews in the school's front office conference room. Each interview lasted approximately 30 minutes. The researcher used two audio recorders to gather data from the interview. Before the interview began, the participant signed another informed consent form. A third party transcribed the audio recordings from the interviews. The researcher manually coded the interview data based on similar themes that appeared among the participants' responses.

Instrumentation

After pilot study participants completed the web-based survey, the researcher conducted a focus group discussion to receive feedback from participants. The researcher asked participants to discuss any recommendations or questions regarding the survey. The pilot study discussion group took place in the same classroom as the participants completed the surveys for the pilot study. The researcher followed the focus group protocol and asked participants for feedback and to answer any questions regarding the survey. The focus group discussion lasted approximately 30 minutes.

The items in the surveys were created from information obtained in the literature review. Both instruments were administered online with SurveyMonkey and used a Likert scale to score responses. The 21-question survey on teachers' perceptions asked participants to respond based on the accuracy of the statements regarding student motivation. Response options were as follows: (5) *Strongly Agree,* (4) *Agree,* (3) *Neither Agree nor Disagree,* (2) *Disagree,* (1) *Strongly Disagree*. The survey was coded according to the following scale: Motivation, Effort, Participation, Interest/Relevance, Family Life, Ambition, Peer Influence, and Self-Esteem. The scale was developed using deductive coding from research gathered during the literature review (Miles, Huberman, & Saldaña, 2014). Using deductive coding allows the researcher to use codes that have emerged through the research questions, conceptual framework, literature review or problem areas of the study (Miles et al., 2014). The first survey administered, on teachers' perceptions of student motivation, also included demographic information, such as years of teaching experience, highest degree received, and classes currently teaching. The 24-item instructional strategies survey asked participants to respond based on the frequency of use for the instructional strategy listed. Response options were as follows: (5) *Always,* (4) *Very Often,* (3) *Sometimes,* (2) *Rarely,* (1) *Never.* The survey was coded based on the following scale: Communication, Interest/Relevance, Collaborative Learning, Interactive Learning, Visual Representations, Critical Thinking, Technology, Assessment, Traditional Methods and Planning/Preparation. The scale was developed from research gathered during the literature review. Quantitative data received from the surveys were analyzed using the Statistical Package for the Social Sciences (SPSS).

Surveys were administered through SurveyMonkey, a web-based survey program. Participants completed two surveys, (1) Perceptions of At-Risk Students' Motivation Survey and (2) Instructional Strategies Survey, after the conclusion of the weekly mathematics department meeting. Each survey took no more than 30 minutes to complete. The surveys were created through SurveyMonkey, a password protected web-based survey program. The surveys were password protected to avoid unauthorized users access to the survey.

Through SurveyMonkey, the researcher enabled SSL encryption to ensure that sensitive data were transmitted securely from the participant's computer to the SurveyMonkey servers (SurveyMonkey Inc., 2019). Through SurveyMonkey, the researcher turned off the option of saving the IP address. SurveyMonkey recorded the time stamp for each participant's responses. Responses were returned immediately to the researcher via SurveyMonkey online and kept safeguarded on a password protected file on the researcher's password protected computer. Participants' responses were recorded on a spreadsheet. All surveys, responses, and information gathered from the surveys were kept confidential and viewed only by the researcher. Identifiable information was not accessible nor printed in the dissertation. Six months after the conclusion of the study, all data will be destroyed.

The researcher developed and followed the Interview Protocol for each interview and used probing questions when needed to obtain further information from participants. The literature guided the initial interview questions while survey data lead to more prompts to obtain clarification from participants. Semi-structured individual interviews were conducted by the researcher and took place in the school's front office conference

room. Each interview lasted approximately 30 minutes. Interviews were audio recorded and transcribed by a third party. Transcriptions and electronic data will be deleted after 5 years.

Participant Risks and Benefits

For both the pilot study and current study, the researcher guaranteed the participants' confidentiality was upheld by storing all data on a password-protected computer hard drive, which was kept at the researcher's home. The data were also on a password protected backup flash drive, which was kept at the researcher's home. All data will be deleted after 5 years. To reduce any disruptions during interviews, all interviews were conducted after school, and the researcher placed "Do not disturb" signs outside the conference room before conducting interviews. There were not any potential benefits for the participants.

Confidentiality

Demographics were used to describe the sample and categorize the participants into groups (e.g., years of teaching experience, degree major, grade level and content area currently teaching). To maintain confidentiality participants were coded, and their names were not used in the pilot study or current study. After completing the surveys, the researcher used the participant's responses and a method of purposeful sampling to select eight participants for the individual interviews. The researcher was the only one to have access to any identifiable information. Data were stored electronically on a password-protected computer kept at the researcher's home and on a password-protected backup flash drive. Data will be deleted after 5 years.

Validity and Trustworthiness of Data

The pilot study of the surveys was administered to establish validity of the study and determine if there were any problems with the procedures, directions, or wording of the items. Participants of the pilot study were former mathematics teachers who did not participate in the current study. Changes to the Instructional Strategies Survey instrument were recommended by the pilot study participants. The researcher considered those changes and adjusted the instrument.

Interviews were conducted by the researcher and transcribed by a third-party vendor. The researcher developed and followed the Interview Protocol for each interview and used probing questions when needed to obtain further information from participants. The literature guided the initial interview questions while survey data lead to more prompts to obtain clarification from participants. Data from interviews were categorized by grade level currently teaching, years of experience, student motivation factors, and types of teaching pedagogy (Onwuegbuzie, Dickinson, Leech, & Zoran, 2009). The researcher used in-vivo coding to analyze the qualitative data from interviews. "In-vivo coding uses words or short phrases from the participants' own language in the data record as codes" (Miles et al., 2014 p. 74). The researcher chose to use in-vivo coding to maintain the true meaning of the participants' responses. From personal experience and review of educational literature, the researcher was aware that several teaching strategies and educational terms could be used to describe the same topic primarily. In-vivo coding was a method of coding that assisted the researcher to best analyze participants' responses by using the participants' own words.

To confirm the trustworthiness of the qualitative data, the researcher utilized the strategy of member checking. Hays and Singh (2012) described member checking as "involving participants in the research process and striving to accurately portray their intended meanings when outlining overall themes" (p. 206). Member checking was used to help improve the credibility and trustworthiness of the researcher's interpretations of the participants' responses (Miles et al., 2014; Teddlie & Tashakkori, 2009). As a method for confirming the quality of data collected, member checks include inviting participants to confirm the interviewer's representations and understandings of the participant's responses (Teddlie & Tashakkori, 2009). "If participants agree with the investigators' interpretations, then evidence for the trustworthiness of the results is provided" (Teddlie & Tashakkori, 2009 p. 295). Data from the study were reported by research question and represented through tables and narrative.

Ethics

Permission to Conduct the Study

To obtain permission to perform the current study, the researcher requested approval from the Institutional Review Board (IRB). An IRB application requesting permission to conduct research involving human subjects was submitted. IRB requests are mandatory to ensure any research involving humans is conducted in an ethical manner. The IRB application contained specific information about the research, including all project information, human research participants, recruitment procedures, methods, risk and benefits, and confidentiality. In addition to the submission of the IRB application, informed consent was given to all the participants in the study (Appendix F). The IRB application and letter of consent was given to the researcher's committee chair

at Columbus State University in Columbus, Georgia. Permission was then granted by the IRB committee to perform the study.

Ethical Considerations

Written request and consent forms (Appendix E) were sent to the school principals to gain permission to administer the survey instrument online, followed by one-on-one interviews for a subgroup of the participants. Each of the participants received a written request and consent to gain permission to conduct the survey instrument. After the subgroup of participants was chosen to participate in the interviews, each of the participants received a written request and consent to gain permission to conduct a person-to-person interview with open-ended questions. Within the written request, the participants were informed that the identity of participants would remain confidential throughout the study; if participants did not feel comfortable answering a question, they had the option to say, "I would rather not answer," and the researcher would not ask that question again. Also, if participants felt uncomfortable at any point during the interview, they had the right to ask for a break without consequence.

Role of Researcher

The researcher had taught either middle school or high school mathematics during her nine years of teaching experience. During that time, the researcher taught a diverse group of students including gifted, special education, and at-risk students. The researcher acquired an interest in students' motivation in mathematics, especially for at-risk students. Additional interest arose in teaching strategies utilized in middle school and high school mathematics classrooms, which contained at-risk students. For these reasons, the researcher focused on middle and high school teachers for the study. The researcher

fulfilled the position as the interviewer for the semi-structured interviews to guide the discussion toward answering the research questions and encourage discovery in a friendly, approachable, and unrestricted setting.

The interviews took place in a secure setting, away from distractions and other people. The researcher audiotaped the interviews and gave each participant a specific letter to represent their identity. The audiotapes were sent to a third-party vendor to be transcribed. The researcher kept the participants' identity out of the research. Although the researcher may have personal beliefs regarding the interview questions, the researcher refrained from voicing personal opinions and maintained an open forum for participants to voice their opinion fully and answer questions truthfully.

In order for the researcher to conduct the interviews in a professional manner and allow for truthfulness from the participant, the researcher strived to be knowledgeable in the subject area, maintained a structured interview process, asked clear questions that were gentle and sensitive to the participants' beliefs, and provided time to finish answering questions without rushing participants to ensure participants felt welcome to elaborate on questions and answers provided. The researcher guided the interview to make sure that the participant remained on track during the interview process. When beginning the interview, the researcher explained the reason for the interview and the sequence of events that would occur during the interview, and the length of time the interview may last. Participants were asked if they had questions for the interviewer before the interview began. At the closing of the interview, the researcher summarized the interview and asked the participant if the interviewer interpreted the responses correctly.

Data Analysis

Once the data were collected from the surveys, the researcher began the process of data analysis. Using SPSS, the researcher was able to obtain descriptive statistics, such as frequency distribution, percentages, median, and mode of the data on teacher perceptions of at-risk students' motivation and determine how often mathematics teachers are using instructional strategies best suited for at-risk students. According to Teddlie and Tashakkori (2009), descriptive analysis is the examination of numeric data to find "summary indicators that can efficiently describe a group and the relationships among the variables within that group" (p. 24). In addition to using SPSS to organize and analyze the quantitative data from the surveys, the researcher used cross-tabulations to examine more than one variable at one time (Teddlie & Tashakkori, 2009). For example, the researcher analyzed data from teachers' years of experience and whether they taught high school or middle school mathematics. The quantitative data analysis was displayed through tables and charts.

The audio recordings from interviews were transcribed by a third-party and analyzed by the researcher for emerging codes and themes. After receiving the transcriptions, the researcher manually coded and reviewed the data for in-vivo codes, using the actual words or language of the participants in the data (Miles et al. 2014; Saldaña, 2015). For second cycle coding, the researcher used axial coding to develop more complex themes (Saldaña, 2015). Axial coding defines "a category's properties and dimensions and explores how the categories and subcategories relate to each other" (Saldaña, 2015 p. 236). The researcher used axial coding to reorganize the data and identify which codes were the most important and which were the least important

(Saldaña, 2015). Member checking was used to ensure the trustworthiness of the data (Miles et al. 2014). During member checks, participants are asked to review the researcher's understandings of the participants' responses and provide feedback to the researcher on the accuracy of the researcher's understanding (Teddlie & Tashakkori, 2009). The researcher used member checks to confirm the researcher's interpretations of the participants' responses from the interviews (Miles et al. 2014). Through member checking, participants assisted the researcher in ensuring anonymity by identifying any information that would allow readers to identify the participant (Miles et al. 2014). The qualitative data analysis was reported in table and narrative format

Summary

The methodology used in the current study was a mixed methods design to examine teacher perceptions. Specifically, the study focused on teachers' perceptions of their own pedagogy as it relates to at-risk students in mathematics. Of the numerous types of mixed methods designs, the researcher decided an explanatory, sequential mixed methods design would be best for the current study. The researcher first collected and examined quantitative data from two surveys, then the researcher obtained and analyzed qualitative data from interviews. Both surveys were designed by the researcher based on information gathered from the literature review.

Permission to conduct the study was obtained from the IRB. Request for consent letters were sent to the local school system's superintendent and principals, to gain approval to conduct the study within the school system. A pilot study was administered with middle and high school mathematics teachers, to determine validity of the surveys. Participants for the pilot study were mathematics teachers who were not participating in

the actual study. Recommendations from the pilot study were considered, and alterations were made to the surveys if needed.

Stratified purposeful sampling was used to condense the participants in the sample by identifying teachers by classes they were currently teaching and years of teaching experience. The participants were middle and high school mathematics teachers in a rural South Georgia district. After completing the surveys, the sample was divided into two subgroups, middle school mathematics teachers and high school mathematics teachers. Of those subgroups, four teachers from each group were asked to participate in the interview portion of the study. Participants' identities remained confidential throughout the entire study.

For the quantitative part of the study, the survey instruments were administered online through SurveyMonkey and used a Likert five point scale to determine participants' level of agreement or disagreement with the instrument items. The teachers' perception survey allowed the researcher to obtain information from participants regarding their perceptions of at-risk students' motivation. The instructional strategies survey allowed the researcher to collect data from the participants regarding the teaching strategies used in their mathematics classroom. The researcher used SPSS software to analyze the quantitative data from the study.

The qualitative part of the study consisted of semi-structured interviews with open-ended questions regarding teacher perceptions of their own pedagogy in mathematics. The researcher explained the interview protocol to participants and reviewed confidentiality for the study. Participants were free to stop the interview, take a break, or say, "I would rather not answer," at any time without penalty. Interviews were

audio-recorded and transcribed by a third-party vendor. Common themes emerged after coding keywords and phrases within the participants' responses. Member checking was used to validate the data. After the researcher obtained all transcripts, the participants were given an opportunity to review the transcript, check for accuracy, and make corrections if needed.

CHAPTER IV

RESULTS

Introduction

The purpose of the current study was to determine teacher perceptions of at-risk students' motivation in mathematics education and teacher perceptions of their own pedagogy in mathematics education. The research questions that guided the study were: (1) What are middle and high school teachers' perceptions regarding at-risk students' motivation as it relates to mathematics?; (2) What strategies do teachers report using for mathematics instruction?; and (3) What are middle and high school teachers' perceptions of their own pedagogy in mathematics as it relates to at-risk students' motivation? Survey One regarding teachers' perceptions addressed Research Question 1, and Survey Two, regarding instructional strategies used in mathematics classes and the frequency of use for each strategy, addressed Research Question 2. Both surveys were administered by the researcher through an online survey website, SurveyMonkey. Individual interviews were conducted with middle school and high school mathematics teachers to address Research Question 3.

Survey One and Two were administered at the end of the weekly mathematics meeting by the researcher. Both surveys were administered through SurveyMonkey, an online survey website. The researcher analyzed the findings from both surveys using SPSS. Then, the researcher narrowed the sample of participants to identify four middle school and four high school mathematics teachers to interview individually. Of the four

teachers chosen to interview at the middle school, two were identified as novice teachers (having less than 10 years of teaching experience) and two identified as veteran teachers (having 10 or more years of experience). The researcher also chose two novice and two veteran teachers from the high school to interview individually. The researcher used in-vivo and axial coding to identify themes among the qualitative data from the interviews.

Participants

The researcher focused the current study on the perceptions of middle and high school mathematics teachers. Within the school district, there were 16 mathematics teachers total, eight at the middle school and eight at the high school. The researcher attended the weekly mathematics meeting, explained the study to the potential participants, and stepped outside the room for participants to complete the surveys if they chose to participate. A Chromebook was available to all participants and if they chose to participate, the survey was already available on the Chromebook. After approximately 15 minutes, the researcher returned to the room. All 16 mathematics teachers were asked to participate in Survey One and Survey Two, and all 16 agreed and gave consent to participate. The researcher administered each survey at a different weekly mathematics meeting, which totaled two weeks to complete both surveys.

Of the 16 participants, 13 were female, and only three were male. There was one male who taught middle school mathematics and two males who taught high school mathematics. Within the sample of participants, four teachers had 0 to 5 years of experience, zero teachers had 6 to 10 years of experience, seven teachers had 11 to 15 years of experience, three teachers had 16 to 20 years of experience, one teacher had 21 to 25 years of experience, and one teacher had more than 25 years of experience. The

participants held bachelor's, master's, and specialist's degrees. There were five teachers who were currently teaching gifted education classes. Three middle school mathematics teachers and two high school mathematics teachers taught gifted education classes at the time of the study. Participants' descriptions are represented in Table 8.

Table 8

Participants' Descriptions Table

Gender	Number	Percent of sample
Male	3	18.75%
Female	13	81.25%
Total	16	100%
Years of Experience	**Number**	**Percent of sample**
0-5	4	25%
6-10	0	0%
11-15	7	43.75%
16-20	3	18.75%
21-25	1	6.25%
25 or more	1	6.25%
Total	16	100%
Degree Type	**Number**	**Percent of sample**
Bachelor's	3	18.75%
Master's	9	56.25%
Specialist's	4	25%
Total	16	100%
Class Type	**Number**	**Percent of sample**
Gifted	5	31.25%
Non-gifted	11	68.75%
Total	16	100%

The researcher used code names for the participants to keep their identity confidential. For the middle school participants, the researcher used the code MS and numbers one through eight, such as MS1, MS2 and so on. For the high school participants, the researcher used the code HS and numbers one through eight, such as HS1, HS2 and so on. After the surveys were administered, the researcher narrowed the participant sample by reviewing years of teaching experience (Survey One demographics) and type of instructional strategies used the most in the mathematics classroom (Survey Two). The researcher identified two novice teachers (less than 10 years of teaching experience) and two veteran teachers (10 or more years of teaching experience) from both the middle school and high school. The researcher also identified participants who used a broad and diverse range of instructional strategies. Four middle school and four high school participants were then asked to participate in an individual interview with the researcher. All eight agreed to participate and signed consent forms. Individual interviews were conducted during the participants' planning period or after school in the conference room. All interviews were completed within one week.

Findings

Research Question 1

Survey One was designed to answer the first research question for the current study: (1) What are middle and high school teachers' perceptions regarding at-risk students' motivation as it relates to mathematics? After Survey One was administered online through SurveyMonkey, the researcher analyzed the data using SPSS software and attained descriptive statistics, such as the mean, and percentage of the data regarding teacher perceptions of at-risk mathematics students' motivation.

On Survey One, participants ranked their beliefs of each statement using the following Likert scale: (5) *Strongly Agree,* (4) *Agree,* (3) *Neither Agree nor Disagree,* (2) *Disagree,* (1) *Strongly Disagree*. Survey One questions with a mean score of 3.5 or higher were mostly answered with *agree or strongly agree*. Those survey items were question numbers 4, 5, 7, and 11. Those questions asked participants about their perceptions of at-risk students regarding (4) displaying minimal effort at school, (5) having more motivation when the content makes a real-life connection to the students' everyday life, (7) desiring to be accepted by their peers, and (11) lacking support at home. Survey One question numbers 7 and 11 had the highest mean score overall, with question 7 having a mean of 4.06 and question 11 having a mean of 4.0. On Survey One question seven, 62.5% of the participants responded *Agree* and 25% of the participants responded *Strongly Agree* regarding students' motivation being affected by the desire to be accepted by their peers. On Survey One question 11, 56.3% of participants responded *Agree* and 25% of participants responded *Strongly Agree* when asked about students lacking support at home.

Some questions had a mean score between 3.0 and 3.5, meaning that participants mostly chose *neither agree or disagree* as their answer for those questions. There were two questions with a mean score in this category, questions 6 and 16. Both questions had a mean score of 3.06. Survey One question 6 asked participants about their perceptions related to at-risk students' plans to not continue their education. Survey One question 16 asked participants about their perceptions regarding at-risk students wanting to be successful in school.

Survey One questions 1, 3, 8, 9, 10, 12, 13, 14, and 15 had a mean score of 3.0 or below. Questions with a mean score of 3.0 or below were mostly answered with *disagree or strongly disagree.* These questions asked participants about their perceptions with at-risk students' (1) effort to learn new concepts, (3) engagement in content related tasks, (8) lack of ability to be self-motivated, (9) confidence in their academic abilities, (10) effort toward achieving their academic goals, (12) level of high self-esteem, (13) parental attendance of school conferences, (14) focus and completion of classwork, and (15) desire to perform well in front of their peers. Of these survey items, question 8 was written negatively as a part of the survey creation. Question 8 asked participants if at-risk students lacked the ability to be self-motivated. Thirty-seven percent of participants responded that they disagreed with that statement, while a comparable 31.3% of participants responded that they agreed with that statement.

Table 9

Survey One Descriptive Statistics

Item	*N*	*min*	*max*	*M*	*SD*
Q1	16	1	4	2.50	0.816
Q2	16	1	4	2.56	0.814
Q3	16	3	4	3.69	0.479
Q4	16	2	5	4.00	0.730
Q5	16	2	5	3.06	0.854
Q6	16	2	5	4.06	0.772
Q7	16	1	5	2.94	1.124
Q8	16	1	4	2.25	0.931
Q9	16	1	4	2.69	0.873
Q10	16	2	5	4.00	0.816
Q11	16	1	3	2.13	0.619
Q12	16	1	3	1.81	0.655
Q13	16	1	3	2.06	0.574
Q14	16	1	4	2.50	0.966
Q15	16	1	5	3.06	0.929

Survey One was designed to answer Research Question 1 (What are middle and high school teachers' perceptions regarding at-risk students' motivation as it relates to mathematics?). The researcher found that middle and high school teachers perceived at-risk students as displaying little effort at school, having more motivation when the content makes a real-life connection to the students' everyday life, desiring to be accepted by their peers, and lacking support at home. The researcher also discovered that middle school and high school teachers believed at-risk students do not put forth effort to learn new concepts, are not engaged in content related tasks, do not lack of ability to be self-motivated, do not have confidence in their academic abilities, are not putting forth effort toward achieving their academic goals, experience levels of high self-esteem, have minimal parental attendance of school conferences, do not focus and complete classwork, and desire to perform well in front of their peers.

Research Question 2

Survey Two was designed to answer the second research question for the current study: (2) What strategies do teachers report using for mathematics instruction? After Survey Two was administered online through SurveyMonkey, the researcher analyzed the survey data through SPSS to find descriptive statistics, such as mean, percentages, and frequency distribution, to determine how often mathematics teachers used specific instructional strategies.

Like Survey One, 16 participants were asked to participate in survey two. Eight participants taught middle school mathematics and eight taught high school mathematics. Of those 16, all participants agreed and gave consent to participate in Survey Two. Survey Two asked participants about instructional strategies used in their mathematics

classrooms and how often they used the strategy. Participants used the following Likert scale to determine the frequency of use for each instructional strategy: (5) *Always*, (4) *Very Often,* (3) *Sometimes,* (2) *Rarely,* (1) *Never.* Survey Two questions with a mean score of 4.0 or above represented survey items to which participants mostly responded with Very Often or Always. Those survey items were question numbers 5, 14, 15, 17, 19, 23, and 24. Those questions asked participants how often they (5) encourage the use of appropriate math vocabulary, (14) use purposeful questions to assess students' understanding, (15) use technology such as Kahoot, Quizizz, etc., (17) provide students with feedback to clear up misconceptions, (19) follow the pacing guide closely, (23) use graphic organizers to visually display math concepts, and (24) use multiple representations to represent math concepts.

One question had a mean score below 3.0 on Survey Two. That question was number 20 and asked participants about using the textbook as a guide for planning instruction. Thirty-seven percent of participants responded that they rarely use the textbook as a guide for planning instruction, and 31.25% indicated that they sometimes use the textbook as a guide for planning. Questions 8, 9, and 21 had a mean between 3.0 and 3.4, while over half of the survey items (52%) had a mean between 3.4 and 4.0. Survey Two question 8 asked participants how often they use mathematics-related games to assist students in learning mathematics content. Fifty percent of participants responded *Very Often* and 43.75% of participants responded *Sometimes* to question 8. Survey question 9 asked participants about how often they use stories, songs, and/or rhymes to teach math concepts. Fifty-six percent of participants responded to question 9 with *Sometimes*, while 37.5% responded with *Very Often*. Survey Two question number 21

asked participants about how often they use learning through movement to help students focus on math concepts. Only 18.75% of participants responded with *Very Often*, and 62.5% responded with *Sometimes*. Descriptive statistics for Survey Two were provided in Table 10. Response data from teachers with 0 to 5 years of experience were provided in Table 11, teachers with 6 to 10 years of experience were displayed in Table 12, teachers with 11 to 15 years of experience were displayed in Table 13, and teachers with 20 or more years of experience were displayed in Table 14.

Table 10

Survey Two Descriptive Statistics

Item	*N*	*min*	*max*	*M*	*SD*
Q1	16	1	3	2.13	0.619
Q2	16	1	3	2.19	0.655
Q3	16	1	4	2.06	0.574
Q4	16	1	3	1.88	0.619
Q5	16	1	4	2.44	0.727
Q6	16	1	4	2.50	0.816
Q7	16	2	4	2.56	0.629
Q8	16	2	4	2.75	0.577
Q9	16	1	3	2.44	0.814
Q10	16	1	3	2.25	0.775
Q11	16	1	3	2.13	0.619
Q12	16	1	3	2.38	0.619
Q13	16	1	3	2.06	0.772
Q14	16	1	3	1.75	0.577
Q15	16	1	4	2.13	0.885
Q16	16	1	3	1.94	0.680
Q17	16	1	4	2.31	1.078
Q18	16	1	4	2.06	0.929
Q19	16	2	5	3.69	0.946
Q20	16	1	4	2.88	0.719
Q21	16	1	3	2.38	0.619
Q22	16	1	4	2.00	0.730
Q23	16	1	3	1.87	0.500
Q24	16	1	4	2.19	0.981

Table 11

Survey Two - Teachers with 0-5 Years of Experience Data Results

Item	*N*	*min*	*max*	*M*	*SD*
Q1	4	3.00	4.00	3.2500	0.50000
Q2	4	3.00	4.00	3.2500	0.50000
Q3	4	4.00	4.00	4.0000	0.00000
Q4	4	3.00	5.00	3.7500	0.95743
Q5	4	2.00	5.00	3.5000	1.29099
Q6	4	2.00	3.00	2.5000	0.57735
Q7	4	3.00	4.00	3.2500	0.50000
Q8	4	3.00	4.00	3.5000	0.57735
Q9	4	3.00	4.00	3.5000	0.57735
Q10	4	3.00	5.00	3.7500	0.95743
Q11	4	3.00	4.00	3.5000	0.57735
Q12	4	3.00	4.00	3.5000	0.57735
Q13	4	3.00	4.00	3.5000	0.57735
Q14	4	4.00	5.00	4.5000	0.57735
Q15	4	3.00	5.00	3.7500	0.95743
Q16	4	3.00	5.00	4.0000	0.81650
Q17	4	2.00	5.00	4.0000	1.41421
Q18	4	3.00	5.00	4.0000	1.15470
Q19	4	2.00	4.00	2.7500	0.95743
Q20	4	2.00	4.00	2.7500	0.95743
Q21	4	3.00	4.00	3.5000	0.57735
Q22	4	2.00	5.00	3.7500	1.25831
Q23	4	3.00	5.00	4.0000	0.81650
Q24	4	4.00	5.00	4.5000	0.57735

Table 12

Survey Two - Teachers with 11-15 Years of Experience Data Results

Item	*N*	*min*	*max*	*M*	*SD*
Q1	7	2.00	5.00	3.8571	1.06904
Q2	7	2.00	5.00	3.8571	1.06904
Q3	7	2.00	5.00	3.5714	1.13389
Q4	7	2.00	5.00	4.0000	1.00000
Q5	7	2.00	4.00	3.1429	0.69007
Q6	7	2.00	4.00	3.4286	0.78680

(continues)

Table 12

Survey Two - Teachers with 11-15 Years of Experience Data Results (continued)

Q7	7	2.00	4.00	3.0000	0.81650
Q8	7	2.00	4.00	3.1429	0.69007
Q9	7	2.00	5.00	3.4286	1.13389
Q10	7	3.00	5.00	3.5714	0.78680
Q11	7	3.00	5.00	4.0000	0.81650
Q12	7	2.00	5.00	3.7143	0.95119
Q13	7	2.00	5.00	4.0000	1.00000
Q14	7	2.00	5.00	3.7143	0.95119
Q15	7	2.00	5.00	3.5714	1.13389
Q16	7	2.00	5.00	4.0000	1.00000
Q17	7	2.00	5.00	3.2857	1.11270
Q18	7	2.00	4.00	3.4286	0.97590
Q19	7	1.00	4.00	2.5714	0.97590
Q20	7	2.00	5.00	3.2857	0.95119
Q21	7	3.00	5.00	3.7143	0.75593
Q22	7	3.00	5.00	4.0000	0.57735
Q23	7	3.00	5.00	4.0000	0.57735
Q24	7	1.00	5.00	2.8571	1.34519

Table 13

Survey Two - Teachers with 16-20 Years of Experience Data Results

Item	*N*	*min*	*max*	*M*	*SD*
Q1	3	4.00	4.00	4.0000	0.00000
Q2	3	3.00	4.00	3.6667	0.57735
Q3	3	4.00	4.00	4.0000	0.00000
Q4	3	4.00	5.00	4.3333	0.57735
Q5	3	4.00	4.00	4.0000	0.00000
Q6	3	4.00	4.00	4.0000	0.00000
Q7	3	4.00	4.00	4.0000	0.00000
Q8	3	3.00	4.00	3.3333	0.57735
Q9	3	3.00	3.00	3.0000	0.00000
Q10	3	3.00	5.00	4.0000	1.00000
Q11	3	3.00	4.00	3.6667	0.57735
Q12	3	3.00	4.00	3.3333	0.57735
Q13	3	3.00	5.00	3.6667	1.15470
Q14	3	4.00	5.00	4.6667	0.57735
Q15	3	3.00	5.00	4.0000	1.00000

(continues)

Table 13

Survey Two - Teachers with 16-20 Years of Experience Data Results(continued)

Q16	3	3.00	4.00	3.6667	0.57735
Q17	3	3.00	4.00	3.6667	0.57735
Q18	3	3.00	5.00	4.0000	1.00000
Q19	3	1.00	2.00	1.6667	0.57735
Q20	3	3.00	3.00	3.0000	0.00000
Q21	3	3.00	4.00	3.3333	0.57735
Q22	3	3.00	4.00	3.6667	0.57735
Q23	3	4.00	4.00	4.0000	0.00000
Q24	3	4.00	4.00	4.0000	0.00000

Table 14

Survey Two - Teachers with 21 or More Years of Experience Data Results

Item	*N*	*min*	*max*	*M*	*SD*
Q1	2	4.00	4.00	4.0000	0.00000
Q2	2	4.00	4.00	4.0000	0.00000
Q3	2	4.00	4.00	4.0000	0.00000
Q4	2	4.00	4.00	4.0000	0.00000
Q5	2	3.00	4.00	3.5000	0.70711
Q6	2	3.00	5.00	4.0000	1.41421
Q7	2	3.00	4.00	3.5000	0.70711
Q8	2	2.00	3.00	2.5000	0.70711
Q9	2	4.00	5.00	4.5000	0.70711
Q10	2	4.00	4.00	4.0000	0.00000
Q11	2	4.00	4.00	4.0000	0.00000
Q12	2	3.00	4.00	3.5000	0.70711
Q13	2	4.00	5.00	4.5000	0.70711
Q14	2	4.00	4.00	4.0000	0.00000
Q15	2	4.00	5.00	4.5000	0.70711
Q16	2	4.00	5.00	4.5000	0.70711
Q17	2	2.00	5.00	3.5000	2.12132
Q18	2	5.00	5.00	5.0000	0.00000
Q19	2	1.00	3.00	2.0000	1.41421
Q20	2	3.00	3.00	3.0000	0.00000
Q21	2	4.00	4.00	4.0000	0.00000
Q22	2	4.00	5.00	4.5000	0.70711
Q23	2	4.00	5.00	4.5000	0.70711
Q24	2	3.00	5.00	4.0000	1.41421

In Survey Two, the answer option *Very Often* was chosen 49.48% of the time, which was the most chosen answer option. *Sometimes and Always* were chosen 28.92% and 15.37% of the time, respectively. The two answer options that were chosen the least were *Rarely* (5.45%) and *Never* (0.78%). Question 26 on Survey Two asked participants to list any additional instructional strategies that are used in the mathematics classroom that were not listed on the survey. Table 15 displays the additional instructional strategies.

Table 15

Survey Two - Additional Mathematics Instructional Strategies Provided by Participants

Participant	Additional Mathematics Instructional Strategies Provided
MS1	I often use Prodigy as an instructional strategy in my math class. This is a site that allows students to answer math questions to advance in a game. There are several games that students can play, and teachers can assign specific standards for the students to do.
MS2	GA Frameworks are used in class a good bit. The state tasks allow the students to do hands on activities with partners and learn from each other. They usually do the task with little help from the teacher to begin with. I then go in and assist after they have had time to work out some of the work. Also, instead of doing worksheets where they just work out on paper, I have it where they go around the room and work out one problem. Then they must go to another problem in the room. They are in groups of 2 to 3 to complete them. I allow them to do this instead of just sitting at desk working out the problems.
MS3	Game Based Learning Platforms
MS5	Collaborative partners during guided instructions
HS1	I allow students to grade each other's quizzes, so they can get immediate feedback. Students also see exemplary work or ineffective work.
HS4	Expo markers on desks
HS8	Manipulatives and collaboration are two of my main strategies

Cross tabulation of the quantitative data from Survey Two compares years of teaching experience and how often teachers reported using instructional strategies. The cross-tabulation was used to determine participants for the individual interviews. The researcher used stratified purposeful sampling to narrow the participants to a smaller group for interviews, based on participants who reported using a broad range of instructional strategies and participants who either had less than 10 years or more than 10 years of teaching experience. Four participants who had less than 10 years of teaching experience and four participants with 10 or more years of teaching experience were asked to participate in individual interviews. Of those eight participants, four participants taught at the middle school, and four participants taught at the high school. The researcher used an equal amount of middle school and high school mathematics teachers for interviews to ensure the trustworthiness of the data.

For novice teachers, whose teaching experience is between zero and five years, Survey Two questions 14 and 24 had the highest mean (see Table 11). Both questions refer to using technology in the classroom, such as Kahoot, Quizizz, USA Test Prep, Google classroom, calculators and virtual manipulatives. Survey Two questions 6, 19, and 20 had the lowest mean for teachers with five or fewer years of teaching experience. These questions referred to using concrete manipulatives as a visual representation, using the textbook as a guide for planning instruction, and using learning through movement to help students focus in mathematics. In addition to Survey Two questions regarding technology, questions 3, 16, 17, 18, and 23 were identified as used often by teachers with five or fewer years of teaching experience. These questions referred to engaging students in verbal communication, providing students with feedback to clear up misconceptions,

giving homework at least three times a week, following the pacing guide closely, and using multiple representations to represent mathematics concepts.

The researcher grouped the participants by years of teaching experience in five-year increments; however, there were no teachers in the participant sample with 6 to 10 years of experience. Teachers with 11 to 15 years of experience answered questions 7, 19, and 24 with the lowest mean (see Table 12). Questions 7, 19, and 24 refer to using mathematics-related games to assist students in learning, using the textbook as a guide for planning instruction, and allowing students to use technology, such as calculators and virtual manipulatives. Survey Two questions 4, 11, 13, 16, 22 and 23 had the highest mean. These questions referred to encouraging the use of appropriate mathematical vocabulary, providing tasks that encourage reasoning and problem solving, using purposeful questioning to assess students' understanding of mathematics concepts, providing students with feedback to clear up misconceptions, using graphic organizers to visually display mathematical concepts, and using multiple representations to represent mathematics concepts.

For teachers with 16 to 20 years of experience, Survey Two questions 4 and 14 had the highest mean (see Table 13). These questions refer to encouraging the use of appropriate mathematical vocabulary and using technology, such as Kahoot, Quizizz, USA Test Prep and Google Classroom, for mathematics instruction. Survey Two questions 9, 19 and 20 had the lowest mean. These questions refer to using teacher directed learning, such as teacher lecture, using the textbook as a guide for planning instruction, and using learning through movement to help students focus on mathematics instruction.

In this study, there was one participant in the 20 to 25 years of experience group and one participant with more than 26 years of experience (see Table 14). For this reason, the researcher combined those two groups to create the group with over 20 years of experience. Survey Two questions 9, 13, 15, 16, 18, 22, and 23 had the highest mean. These questions referred to using teacher directed learning, such as teacher lecture, using purposeful questions to assess students' understanding of mathematics concepts, using student data to adjust instruction as needed, providing students with feedback to clear up misconceptions, following the pacing guide closely, using graphic organizers to display mathematical concepts visually, and using multiple representations to represent mathematics concepts. Survey Two questions 8, 19, and 20 had the lowest mean. These questions referred to using stories, songs, and/or rhymes to teach mathematical concepts, using the textbook as a guide to plan instruction and using learning through movement to help students focus during mathematics instruction.

Survey Two was designed to answer Research Question 2 (What strategies do teachers report using for mathematics instruction?), According to the Survey Two data, the researcher found that middle school and high school teachers used the following instructional strategies the most: (1) encourage the use of appropriate math vocabulary, (2) use purposeful questions to assess students' understanding, (3) use technology such as Kahoot, Quizizz, etc., (4) provide students with feedback to clear up misconceptions, (5) follow the pacing guide closely, (6) use graphic organizers to display math concepts visually, and (7) use multiple representations to represent math concepts. The researcher also discovered that in Survey Two, middle school and high school mathematics teachers reported they rarely or sometimes used the following instructional strategies: (1) use

mathematics-related games to assist students in learning mathematics content, (2) use stories, songs, and/or rhymes to teach math concepts, and (3) use learning through movement to help students focus on math concepts. Additionally, the researcher found that overall middle school and high school mathematics teachers reported they did not use the textbook as a guide for planning instruction.

Research Question 3

Individual interviews were conducted to answer the third research question for the current study: (3) What are middle and high school teachers' perceptions of their own pedagogy in mathematics as it relates to at-risk students' motivation? After the interviews were transcribed, the researcher analyzed the data for emerging codes and themes by first using in-vivo coding and then using axial coding. In-vivo coding is a first cycle method of coding qualitative data by using the exact words provided by the participants during the study (Saldaña, 2015). Axial coding is a second cycle method of coding qualitative data that "describes a category's properties and dimensions and explores how the categories and subcategories relate to each other" (Saldaña, 2015, pp. 235-236). Transcriptions were provided to the participants for member checking. Providing transcriptions allowed the participants to review the transcriptions and the researcher's interpretation of the transcriptions. The participants were able to identify any information that may have been misinterpreted by the researcher.

Interviews began with the researcher asking participants to describe their experiences with at-risk students and at-risk students' motivation in mathematics. When participants first discussed at-risk students, they used words, such as "not motivated" or "lazy" to describe at-risk students in mathematics classes. Participants seemed to have a

negative demeanor as they described at-risk students. However, as participants continued discussing their experiences with at-risk students, their demeanor changed to a more positive manner, especially when the researcher asked the probing question "Can you provide an example of difficulties your at-risk students faced in mathematics?"

Participants described difficulties that at-risk students face inside and outside of school. Participant MS1 described their experience with at-risk students as "these students often times have to raise their younger siblings at home because their parents are working multiple jobs" and stated that "they just want to be a kid at school and escape the reality of life after school." Several participants discussed their at-risk students' lack of support at home and struggles outside of school. Participants HS3 described their experience of working with an at-risk student who was not getting enough to eat at home and said "she was hungry and couldn't focus on anything" while at school. Overall, participants described feeling sympathetic for at-risk students because "their situations are not their fault" and "they cannot help it that they are at-risk students."

Participants discussed their experiences with at-risk students, as students who were not as motivated to learn mathematics as other students. Participants also discussed that at-risk students would usually say "I'm not good at math" and try to use that as an excuse to avoid doing the work in class. Additionally, participants added that at-risk students could become more motivated when they felt comfortable in class and trusted their teachers.

The researcher analyzed the interview transcriptions for codes and themes that emerged among the participants' own words. Two themes emerged from the transcriptions regarding at-risk students' motivation and instructional strategies:

relationships and hands-on learning. Every participant mentioned building relationships as the most important step in motivating students in mathematics. A variety of instructional strategies were mentioned during the interviews as an approach to motivate students to learn mathematics; however, all participants mentioned some type of hands-on learning, and most of the participants also mentioned using learning games in the classroom. Several participants mentioned students' lack of confidence in themselves or their mathematics abilities. However, after building relationships and trying different instructional strategies, students became more confident in themselves personally and academically.

Within the two themes that emerged, four subcategories were formed. Theme One, Relationships, had two subcategories: (a) show students you care and (b) student confidence and success. During individual interviews, participants described at-risk students before relationships are built with the teachers. Participants described at-risk students with words, such as "they simply give up" (Participant MS1), "low self-esteem" (Participant MS2), and "had nothing to lose" (Participant HS2). However, after establishing relationships with teachers, participants then described at-risk students with words, such as "more motivated" (Participant HS1), "more confident" (Participant HS3), and "work harder and with a better attitude" (Participant MS4).

Theme One subcategory (a), show students you care, developed when participants discussed ways to establish relationships with students and show students you care. Activities, such as "get to know you activities" (Participant MS1), "true or false about me game" (Participant MS3), "advisor activities" (Participant HS2), and "student interest surveys" (Participant HS3) were described by participants to establish relationships and

learn about one another at the beginning of the school year. Participants also discussed "staying connected" (Participant MS4), "greeting students by name each day" (Participant HS4), and "genuinely talking with students, instead of talking at students" (Participant MS2) helped to show students that teachers care about them and established trust between students and teachers. "I have found that when the student earns your trust, then they know you are there to help them succeed" (Participant HS1).

One participant said, at the beginning of the year teachers, should "take the time to get to know them and form relationships with them" (Participant HS2). "Often, it is not instructional strategies themselves that help motivate at-risk students to learn. It is the relationships formed with the teacher and knowing that the teacher cares for them" (Participant HS1). Participant MS1 stated, "Many students are lacking support at home, so knowing they have someone in their corner at school means the world to them." Participant HS3 expressed, "Bringing joy to students' faces (by showing them love) gave me hope that they would want to come to school and learn." Participant MS2 described teacher student relationships as "Relationship building is the most beneficial strategy for motivating at-risk students. Let them know that they matter and that you believe in them."

Theme One subcategory (b), student confidence and success, developed through participants descriptions of building relationships with students. Participant MS4 expressed, "Students at any age must be guided in the right direction and praised along the way in order to build their self-esteem." When asked about student motivation in mathematics, Participant HS3 stated, "If I take the time to get to know my students and show them that I truly care about them then they are more motivated to participate in

class." Participant MS3 stated something very similar regarding student motivation in mathematics. "Once the students felt more confident, then they were more motivated to complete assignments" (Participant MS3). Responses from other participants were alike regarding student success in mathematics. Participant MS4 expressed, "When at-risk students have success in something, they tend to work harder and with a better attitude." Participant MS1 described how they use a variety of strategies for each class, in order to find what works best for each group of students. "Since students are individual beings, different strategies might need to be used for students. I have to teach all of my different classes in different ways for them to be successful and more confident" (Participant MS1). Participant HS4 discussed how they knew that establishing relationships with students helped students to become successful in mathematics. "I know that these practices [student-teacher relationships] helped motivate at-risk students because their grades improved on assessments and they were more confident when participating in class" (Participant HS4).

One participant (MS3) told a very descriptive story about a former student who came to class and wanted to "hide in the back of the room and be invisible." This student tried to "hide" by using his hair to cover his face, sitting in the back of the classroom, and not talking to anyone. The participant explained that through talking individually with the student, frequent monitoring, and giving praise for progress in class the student "came out of hiding" and started to "shine" when he participated in class. This student passed his mathematics class and continued to be successful in mathematics.

Giving students praise and rewarding students was important to the participants. Participant HS4 mentioned, "Students at any age must be guided in the right direction

and praised along the way in order to build their self-esteem." Some examples of praise that were mentioned by participants were "verbal praise" (Participant MS2), "asking the student to peer tutor another student" (Participant HS3), and "displaying student work on bulletin board for all to see" (Participant HS4). "Rewards are also given for students who make gains," stated Participant MS3. Student rewards for hard work and making progress varied by participant, but overall the participants felt that rewards need to be unique for the student. For example, Participant MS1 stated, "candy doesn't always motivate students" and discussed "free rewards", such as sitting in the teacher's chair during class, sitting by a friend in class or at lunch, being the class helper, or having free time to read or draw. However, candy may be beneficial as a reward for some students. Participant HS4 stated, "I offer candy as a quick reward. Students want instant gratification, and the candy along with verbal praise is a quick and easy way for me to offer that instant feedback."

Theme Two, Hands-On Learning, had two subcategories: (a) manipulatives and (b) learning games. Manipulatives and learning games were the instructional strategies mentioned the most, of all the strategies mentioned by participants. Mathematics manipulatives are touchable items that are intended to display abstract mathematics concepts as concrete mathematics concepts (Moyer, 2001). These hands-on learning strategies were described by participants as "engaging and fun" and "student centered," which participants stated "help motivate students to participate" in mathematics activities. Participant MS1 stated "Students want to get up and move around. They love to color, draw, and use rulers."

One participant described the reason they used manipulatives in the classroom because “manipulatives work very well to make skills more concrete” (Participant MS3). Throughout the interviews, participants mentioned that at-risk students “benefit from breaking concepts down” (Participant MS4) and “using manipulatives helps students to visually see the concepts without using pencil and paper” (Participant MS1). “The strategy that I have found that works best for at-risk students is using manipulatives as often as possible” (Participant MS2). Often, manipulatives are viewed as a learning tool that is only used for younger students. However, the participants who teach high school mathematics also stated that they used manipulatives in their classes. “I have used manipulatives to help students see, touch, and feel in order to learn” (Participant HS1). “The use of manipulatives is especially useful for my struggling learners” (Participant HS4).

Theme Two subcategory (b), learning games, was discussed very much during interviews as a type of hands-on learning. Participants, both middle school teachers and high school teachers, mentioned using learning games in their classes. Participant HS2 stated, “If you make it a game, students appear to want to learn, and they beg to participate.” Similarly, Participant HS3 revealed, “Games allow students to practice the knowledge they do have in mathematics.” One participant who teaches middle school mathematics expressed, “I used games, like letting students race to the board to compete against one another after they have already worked out a math problem at their seat” (Participant MS1). When participants discussed building relationships with students and using hands-on learning in the classroom, they described students as being successful and more motivated in mathematics. Participants described how “students’ grades increased”

and the students' "level of participation increased." Participant HS1 stated, "When I have used these strategies with my students, I have seen a marked difference in the performance of most students, and, when they are being successful in class, it makes them want to continue to learn and set high standards for themselves."

Analysis of Findings

Through data analysis from Survey One, Perceptions of At-Risk Students' Motivation Survey, the researcher found that the middle and high school mathematics teachers who participated in the study viewed at-risk students as: displaying minimal effort in school as a whole and in mathematics classes, exhibiting low self-esteem and low aspiration to participate in mathematics, allowing their motivation to be affected by the desire to fit in with peers, lacking support at home, and being more motivated to learn if the content is relevant to their everyday lives. The researcher categorized Survey Two, Instructional Strategies Survey, questions using a coding scale that was determined by the review of the literature. The researcher examined data results from Survey Two and found that the middle and high school mathematics teachers who participated in the current study mostly used appropriate mathematics communication, technology for teaching and learning, and frequent assessment and feedback consistently. The traditional strategy of assigned homework at least three times a week was used frequently, as well as the planning strategy of following the pacing guide closely. Visual representations, such as graphic organizers, and critical thinking strategies, were commonly used in mathematics classrooms.

Lastly, through data analysis from individual interviews, the researcher determined that the participants in the study viewed relationships with students as the

single most important factor for motivating at-risk students in mathematics. However, student relationships were not mentioned in any of the instruments provided by the researcher. The theme of student relationships emerged solely after the researcher gathered and evaluated qualitative data. Another theme that emerged from the qualitative data analysis was hands-on learning. Subcategories were developed from this theme using axial coding.

The researcher found that regarding the theme of hands-on learning with at-risk mathematics students, participants expressed the need for teachers to use manipulatives and learning games. Therefore, the subcategories for theme two hands-on learning were (a) manipulatives and (b) learning games. These two hands-on learning instructional strategies were mentioned in Survey Two, Instructional Strategies Survey. One survey question directly mentioned learning games and had a mean of 3.43, with 50% of the participants using mathematics related games very often and 44% using mathematics related games sometimes. Another survey question directly mentioned concrete manipulatives, which was identified by the researcher through individual interview data analysis as a type of hands-on learning, had a mean of 3.5 on a scale of 1 to 5 with 50% of participants using concrete manipulatives very often and 31% using manipulatives sometimes.

Participants stated in Survey One that at-risk students are more motivated in mathematics if the content is relevant to their everyday lives. In Survey Two, there were two questions directly referring to relevancy. One question regarding content relevancy to real-world experiences had a mean of 3.875, with 63% of participants using this strategy very often and 25% using this strategy sometimes. The other question regarding content

relevant to students' interests and everyday lives had a mean of 3.8 with 56% of participants using this strategy very often and 31% using this strategy sometimes. Yet, content relevancy was not identified as a subcategory when the qualitative data were analyzed by the researcher.

Additionally, participants recorded their view of at-risk mathematics students in Survey One as displaying minimal effort and lacking support at home. These views were discussed again in the individual interviews. Participants stated that teachers building relationships with students would increase the amount of effort displayed by at-risk students in mathematics and, hopefully, compensate for the lack of support at home. Participants felt that allowing students to see that their teacher cares about them and is there to help them succeed will boost students' self-esteem in school and in mathematics classes.

Individual interviews were conducted to answer Research Question 3 (What are middle and high school teachers' perceptions of their own pedagogy in mathematics as it relates to at-risk students' motivation?), The researcher found that, overall, middle school and high school mathematics teachers perceived at-risk students as unmotivated and lacking support at home but felt compassionate about assisting at-risk students to be successful in mathematics. The overarching theme that arose from the interview data were middle school and high school teachers perceived teacher and student relationships had the biggest impact on student motivation and success in mathematics. The two themes that resulted from the interview data were relationships and hands-on learning. The researcher found in theme one that middle school and high school teachers believed showing students you care and building relationships with students increased student

confidence and success in mathematics. Additionally, the researcher discovered within theme two that middle school and high school teachers believed hands-on learning, such as manipulatives and learning games, was the best instructional strategy for increasing at-risk students' motivation and academic success in mathematics.

Summary

For this study, the researcher used a mixed methods approach and analyzed both quantitative and qualitative data. Those analyses were discussed in detail, along with participants' descriptive data and demographics. The researcher administered and evaluated two separate surveys to answer Research Questions 1 and 2. The first survey was focused on determining teachers' perceptions of at-risk students in mathematics. The second survey focused on instructional strategies teachers used in mathematics classes. The researcher analyzed the data by sorting the participants into groups based on years of experience. The researcher then gathered qualitative data through individual interviews. The interviews were conducted to answer Research Question 3. The focus of the interviews was on teachers' perceptions on their own teaching styles and strategies when teaching at-risk students in mathematics.

CHAPTER V

DISCUSSION

Summary of the Study

Student achievement in mathematics education depends heavily on student motivation and interest in learning. Students are more willing to work harder in mathematics, if they are motivated, interested, and understand relevance in the topic. For students who are at-risk of not being successful in school, learning mathematics can be extremely challenging. Students of low SES and at-risk of not being successful in school show a decrease in motivation and lose interest in learning as their age increases (Bryan, 2015). Although there are several different factors that affect student motivation in mathematics, a lack of relevant curriculum and lack of teacher support and encouragement are two factors that have a major impact on student motivation (Gilbert et al., 2014; Norman, 2016; Park et al., 2016; Wiesman, 2016). Teachers can assist students with motivation in mathematics through teachers' attitudes and perceptions and the use of appropriate instructional strategies that gain students' interest (Gilbert et al., 2014; Norman, 2016; Park et al., 2016; Wiesman, 2016).

However, to the researcher´s best knowledge, very few publications were available in the literature that address the issue of teacher perceptions of instructional strategies, which establish relevance of mathematics education to students' interests and everyday lives. Very few studies were found in the area of teacher attitudes and perceptions of instructional strategies, which encourage student motivation in

mathematics for at-risk youth. The current study examined teachers' perceptions of at-risk students and instructional strategies used with at-risk students in mathematics education. Study results are beneficial for future and current mathematics teachers, preservice teacher education programs, professional development teams, and curriculum developers by increasing understanding and applying strategies that promote at-risk student motivation and achievement in mathematics. Mathematics educators, preservice teacher education program developers, curriculum and development specialists, and school improvement specialists are the anticipated audience and consumers of this research. All individuals participating in students' education can advance from increasing their knowledge concerning student motivation for learning, especially in the area of mathematics. Understanding student motivation and interest in learning for at-risk students is important for increasing at-risk student achievement.

The researcher conducted a mixed methods study on teacher perceptions of at-risk students' motivation in mathematics and teacher perceptions of their own pedagogy in mathematics regarding at-risk students' motivation. Using an explanatory, sequential design (Creswell, 2003) allowed the researcher to gather quantitative data first, followed by qualitative data. In-vivo and axial coding was used by the researcher to identify emerging themes from the data. Two separate quantitative surveys were administered to acquire data on teacher perceptions of at-risk students in mathematics and frequency of use of instructional strategies during mathematics classes. Semi-structured interviews (Hays & Singh, 2012) were conducted to collect qualitative data. The researcher determined semi-structured interviews were the most appropriate method of data collection for the current study because semi-structured interviews are an exploratory

research method, which can present extensive data on the participants' feelings, attitudes, and perceptions about a certain topic and create a better understanding as to why those perceptions were formed.

Data acquired through the semi-structured interview process allowed for flexibility through participants' possible varying responses (DiCicco-Bloom & Crabtree, 2006; Hays & Singh, 2011; Patton, 1990; Schatz, 2012; Whiting, 2008). Qualitative interviews permitted the researcher to acquire a deeper understanding of teacher perceptions through interview questions, body language, and discussion. Participants were middle school and high school mathematics teachers from a rural South Georgia school district. Data were categorized by teachers' years of experience, student motivation factors, and types of pedagogy (Onwuegbuzie et al., 2009).

Quantitative data were gathered from two separate surveys. From the results of the first survey concerning teacher perceptions of at-risk students' motivation, the researcher established that middle and high school mathematics teachers perceive at-risk students to: exhibit low self-esteem, display minimal effort in school, want to fit in with peers regardless of academic success, have a shortage of support at home, and be motivated to learn when the subject relates to students' everyday lives. After data results from the second survey were examined regarding teachers' perceptions of instructional strategies in mathematics, the researcher concluded middle and high school mathematics teachers commonly used technology for both teaching and learning, appropriate mathematics communication, frequent feedback, and consistent assessments. Students were assigned mathematics homework at least three times a week for individual practice,

and teachers followed the mathematics pacing guide closely. Critical thinking strategies and visual representations were frequently used for mathematics instruction.

The findings from the qualitative data analysis were quite unexpected and suggested that middle and high school mathematics teachers believed students' motivation was affected by more than just students' intrinsic motivation and use of instructional strategies. Through analysis of the individual interview data, the researcher found that building relationships with students was vital when it comes to motivating at-risk students in mathematics. Two themes arose from the qualitative data analysis: relationships and instructional strategies. These themes were further examined in detail, which resulted in subcategories within the themes. The relationships theme was divided into two subcategories: (a) showing students you care and (b) student confidence and success. Middle and high school mathematics teachers described at-risk students who have relationships with teachers as being more confident, more motivated, harder workers, and having a better attitude. Praising and rewarding students often for their success was mentioned repeatedly by participants during individual interviews. Participants felt that praise and rewards helped boost student confidence in mathematics.

The other theme, hands-on learning, had two subcategories that emerged within the theme after qualitative data analysis. The hands-on learning instructional strategies mentioned frequently during individual interviews with middle and high school mathematics teachers were manipulatives and learning games. The categories regarding hands-on learning were (a) manipulatives and (b) learning games. Manipulatives were used for students to view mathematics concepts through concrete representation. After the concrete skill was obtained by students, then teachers could move into teaching the

more abstract mathematics concepts. Learning games were used to incorporate mathematics skills into student centered activities so that students were more interested and more engaged when practicing mathematics skills.

Analysis of the Findings

Research Question 1

Through data analysis of Survey One, Perceptions of At-Risk Students' Motivation Survey, the researcher found that overall participants agreed with the statements concerning at-risk students' motivation as being affected by desire to fit in with their peers and a lack of support at home. Both beliefs were supported by the research in the literature review of the current study. Researchers have found that at-risk students desire acceptance from their peers, and their peers play a major role in the development of at-risk students' attitudes toward education (Noble, 2011; Straus, 2014; Weisman, 2016). Students with low SES (commonly at-risk students) lack family support when it comes to education, which influenced at-risk students' performance in mathematics (Basque & Bouchamma, 2016; Noble, 2011; Norman, 2016; Sealey & Noyes, 2010).

Additionally, the researcher determined through data analysis of Survey One that participants believed at-risk students displayed minimal effort in mathematics but exhibited more motivation in mathematics when the content made a real-life connection to students' everyday lives. Researchers have shown that at-risk students display minimal effort in mathematics for a variety of reasons, such as lacking background knowledge, not having self-confidence, and not viewing mathematics as an important part of their everyday lives (Weisman, 2016; Yildirim, 2012). However, at-risk students do put forth

more effort and motivation to learn when the content makes a real-life connection to the students' everyday life (Crumpton & Gregory, 2011; Fadel, 2015; Sealy & Noyes, 2010). Fadel's (2015) 21st century curriculum study revealed that students overall were also unenthusiastic to learn and disengaged from the learning process because of the lack of relevance within the curriculum and absence of real-world connections.

The researcher of the current study identified additional beliefs of the participants regarding at-risk students through the data analysis of Survey One. Participants believed that at-risk students do not want to be successful in school, do not plan to further their education after high school, do not put forth effort to learn new concepts, do not engage in content related tasks, do not have confidence in their academic abilities, and do not have high self-esteem. Like the participants' beliefs, researchers have found that students need intrinsic motivation to increase desire to learn, effort to be persistent, and success in school (Crumpton & Gregory, 2011; Deci & Ryan, 1985, 2000; Ryan & Deci, 2000). Students, who did not receive appropriate support in school and did not have intrinsic motivation to be successful in school, did not plan to further their education after high school (Hester, 2012; Weisman, 2016). Generally, at-risk students are not motivated to learn new concepts (Weisman, 2016; Yildirim, 2012) and do not engage in content related tasks (Crumpton & Gregory, 2011; Fadel, 2015; Sealy & Noyes, 2010), if they do not view the concept or task as important. According to prior research, at-risk students usually have low self-esteem and confidence in their academic abilities but benefit from teachers who use appropriate instructional practices and build relationships with students (Gilbert et al., 2014; Weisman, 2016).

Research Question 2

Through data analysis of Survey Two, Instructional Strategies Survey, the researcher found that participants generally encourage the use of appropriate math vocabulary, purposeful questions to assess students' understanding, feedback to clear up misconceptions, visual displays and multiple representations in mathematics, and a pacing guide to teach mathematics. Prior researchers have found that using appropriate mathematics vocabulary (Firmender et al., 2014; Kong & Orosco, 2016; NCTM, 2000), purposeful questions to assess students' understanding (NCTM, 2000), and feedback to clear up misconceptions (Bonner, 2014; Crockett et al., 2011; Kong & Orosco, 2016; Yildirim 2012) are instructional strategies that can be beneficial to increase at-risk students' achievement in mathematics. Researchers have determined that instructional strategies, such as graphic organizers for visual displays (Boaler, 2008, 2015; NCTM, 2000), multiple representations to represent math concepts (Jung, 2014; NCTM, 2000; Ottmar et al., 2014), and following the pacing guides to remain in a time conscious and orderly environment (Boaler, 2008, 2015), were useful for at-risk students in mathematics. Using technology in the classroom, such as Kahoot and Quizizz, was another instructional strategy mentioned in prior research to increase at-risk student engagement in mathematics (Boaler, 2008, 2015; NCTM, 2000) and was identified as an instructional strategy used the most by participants in the current study, especially new teachers with 0 to 5 years of experience. In general, participants in the current study did not use a textbook as a guide when planning instruction.

Research Question 3

After the researcher analyzed and coded data from individual interviews, two themes emerged with subcategories. The first theme, (1) building relationships with students was determined with the subcategories (a) show students you care and (b) student confidence and success. The results from the interviews of the current study supported findings from previous researchers concerning building relationships with students and using a variety of engaging instructional strategies in mathematics. Several researchers have identified building relationships with students as an important factor in increasing at-risk students' motivation and engagement in mathematics (Bonner, 2014; Deci et al., 1991; Yildirim, 2012). Additionally, researchers have found at-risk students' confidence and success in mathematics increased when students had relationships with their teachers and felt that their teachers believed in them (Gilbert et al., 2014; Petty et al., 2013; Woolley et al., 2010). Researchers also found that extrinsic incentives were significant to student motivation as well, such as verbal praise, rewards, and grades (Deci & Ryan, 1985, 2000; Ryan & Deci, 2000; Wiesman, 2016).

The second theme that emerged from interview response data, (2) hands-on learning, was developed with the subcategories (a) manipulatives and (b) learning games. These results supported findings from previous researchers regarding instructional strategies best suited for at-risk students in mathematics. Jung's (2014) study found that hands-on learning and learning games, in addition to other instructional strategies, were helpful for strengthening students' mathematics skills and academic success when used with students as early as kindergarten.

Limitations of the Study

Limitations of the current study were found within the sample size of participants and location of the study. The findings were based on middle school and high school mathematics teachers in a rural South Georgia school system. The participants and the responses were unique to this individual school system. Within the sample, there were only three males and 13 females. To better analyze the data, the researcher grouped the participants by the amount of years of teaching experience. The researcher categorized years of experience in five-year increments. There were zero participants in the group with 6 to 10 years of teaching experience, and there were two participants with 20 or more years of teaching experience. Four participants had 0 to 5 years of teaching experience, seven participants had 11 and 20 years of experience, and three participants had 20 to 25 years of experience. The gap in years of teaching experience can alter the results of the current study.

Additional limitations of the current study were the relationship between the researcher and the participants. The researcher has worked alongside some of the participants in the past as a co-worker teaching mathematics within the same South Georgia school district. Some of the participants have also been co-workers of the researcher, the participants may not have taken the study as seriously as others or felt uncomfortable providing information to a former teammate during the interviews. The pilot study participants were former mathematics teachers who were teaching another subject area. Limitations of the pilot study consisted of amount of time since the participants taught mathematics, changes in mathematics standards and instruction since

the participants taught, and the various reasons why the participants were no longer teaching mathematics.

Delimitations of the study were the stratified purposeful participants who were chosen based on use of instructional strategies and years of teaching experience. The participants were a combination of middle school and high school mathematics teachers. Another delimitation was the semi-structured interviews. Four participants from the middle school and four participants from the high school were chosen for interviews. The researcher interviewed the same number of participants from the middle school and high school to maintain the trustworthiness of the data. The researcher chose participants with a variety of years of teaching experience for interviews to represent a wide range of mathematics teachers. At the time of the study, the researcher worked within the same school district as the pilot participants and study participants; however, the researcher did not work directly with participants in the field of mathematics and taught science at the middle school. All participants for the current study worked at the only middle school or high school in the rural South Georgia school district and had experience teaching mathematics within this school district.

Role of Researcher

The researcher has experience teaching mathematics to a variety of students, including at-risk students at both the middle school and high school for over nine years combined. Throughout the researcher's teaching experience, at-risk student motivation became an area of interest. Particularly, the researcher was interested in at-risk students' motivation in mathematics and teaching strategies that promoted student motivation in mathematics classrooms. In order to direct the discussion toward answering the research

questions for the current study, the researcher served as the interviewer for the semi-structured interviews.

Theoretical Framework

Deci and Ryan's (1985) SDT is the theoretical framework used to guide the current study. Deci and Ryan's (1985) SDT concentrates on obtaining one's intrinsic needs in order to achieve happiness and self-content. SDT focuses on three instinctive and psychological needs of individuals: autonomy, competence, and relatedness (Deci & Ryan, 1985). Throughout the study, the researcher found that middle school and high school teachers believed students will demonstrate autonomy, competence, and relatedness after teachers build relationships with students and show students that teachers care about their welfare and progress. Middle school and high school teachers believed students were more motivated, had more self-esteem, and had a better understanding of mathematics concepts after they trusted their teachers and realized they had their teachers support.

Recommendations for Future Research

This study focused on middle and high school mathematics teachers' perceptions of at-risk students' motivation in mathematics. Additionally, this study concentrated on instructional strategies used by middle and high school mathematics teachers when working with at-risk students in mathematics. Lastly, this study focused on teacher perceptions of their own pedagogy when teaching mathematics. Based on the findings of this study, the following recommendations are offered for further research:

1. One recommendations for future research would be to conduct a study with a larger and more diverse sample of teachers. Using a larger sample may produce different

study results, as a larger and more diverse sample could include a greater range of years of teaching experience. To obtain a larger sample, researchers can conduct the study within a larger school district that employs more mathematics teachers or include more than one school district's middle and high school mathematics teachers in the population sample.

2. The quantitative surveys should include items about student and teacher relationships. The survey regarding student motivation did not include any questions regarding relationships, yet this topic was highly discussed during the interviews for this study.

3. The quantitative surveys should include a question regarding what type of instructional resources the teachers had access to in their classrooms. The survey asked participants to rate each question based on the frequency of use for each strategy. However, the survey did not ask if participants had access to the materials and resources needed to use each instructional strategy.

4. The survey instruments should also include items that ask participants about providing at-risk students with praise and rewards for working hard and meeting goals in mathematics. This topic was also discussed in the qualitative interviews but not included in the survey instrument in the current study.

5. Additionally, the survey or interview questions should also address the reason why some instructional strategies are used more than others. For example, teachers may not use certain instructional strategies because they do not have enough materials, such as devices to access online calculators or paper to make a game board and playing pieces.

Another reason participants may not be using certain strategies is that participants are unsure how to implement the strategy properly and need additional training in that area.

Overall, the researcher found the results from the current study very interesting. The survey and interview questions focused on student motivation and the use of instructional strategies. However, the overarching theme is that middle school and high school teachers perceived student motivation was primarily impacted by teacher and student relationships. The results offered a contribution to the current literature regarding middle and high school mathematics teachers' perceptions regarding at-risk student motivation, instructional strategies used for at-risk students in mathematics, and teachers' perceptions of their own pedagogy in mathematics. The findings from the study indicated that middle school and high school mathematics teachers viewed at-risk students as unmotivated in mathematics, but after establishing a relationship with at-risk students, they became more motivated and successful in mathematics. Building a relationship between teachers and students was reported as the single most important factor to increase at-risk student motivation and achievement in mathematics. Additionally, middle school and high school mathematics teachers reported hands-on learning as the best instructional strategy to motivate at-risk students in mathematics. Manipulatives and learning games were the two main types of hands-on learning strategies to increase student motivation in mathematics as indicated by middle school and high school mathematics teachers.

Implications of the Study

The problem statement driving this study focused on a decrease of student interest in learning and motivation as students get older, especially for at-risk students. The

results of the study may encourage teachers to build relationships with students and show students that teachers care for them. The study results also indicated that middle and high school teachers perceived student motivation and academic success increased when students trusted their teachers and had a relationship with their teachers. Additionally, the results of this study may inspire mathematics teachers to consider utilizing instructional practices and strategies, which are more appropriate for increasing at-risk students' motivation and academic success in mathematics. The study results indicated that middle and high school teachers believed hands-on learning, such as learning games and manipulatives, are beneficial for students in mathematics.

Also, teacher preparation programs can advance the curriculum and better prepare preservice teachers by acquiring knowledge concerning at-risk student motivation and interest for learning. Preservice teachers' confidence may increase by knowing best practices and instructional strategies, which encourage student motivation and desire to learn. Teacher and student relationships were proven to be a major factor for student motivation and engagement. Preservice teacher programs, as well as professional development programs, can assist all teachers with strategies to promote relationship building with students.

The results of this study provide awareness into how middle and high school mathematics teachers perceive at-risk students and instructional strategies for mathematics. The researcher found that middle and high school teachers perceived at-risk students as displaying little effort at school, having more motivation when the content makes a real-life connection to the students' everyday life, desiring to be accepted by their peers, and lacking support at home, in response to Research Question 1 (What are

middle and high school teachers' perceptions regarding at-risk students' motivation as it relates to mathematics?). The researcher also discovered in response to Research Question 1 that middle school and high school teachers perceived at-risk students do not put forth effort to learn new concepts, are not engaged in content related tasks, do not lack of ability to be self-motivated, do not have confidence in their academic abilities, are not putting forth effort toward achieving their academic goals, experience levels of high self-esteem, have minimal parental attendance of school conferences, do not focus and complete classwork, and desire to perform well in front of their peers.

In response to Research Question 2 (What strategies do teachers report using for mathematics instruction?), the researcher found that middle school and high school teachers used the following instructional strategies the most: (1) encourage the use of appropriate math vocabulary, (2) use purposeful questions to assess students' understanding, (3) use technology such as Kahoot, Quizizz, etc., (4) provide students with feedback to clear up misconceptions, (5) follow the pacing guide closely, (6) use graphic organizers to visually display math concepts, and (7) use multiple representations to represent math concepts. The researcher also discovered that middle school and high school mathematics teachers reported they rarely or sometimes used the following instructional strategies: (1) use mathematics-related games to assist students in learning mathematics content, (2) use stories, songs, and/or rhymes to teach math concepts, and (3) use learning through movement to help students focus on math concepts. Also, the researcher found that overall middle school and high school mathematics teachers reported they did not use the textbook as a guide for planning instruction.

The researcher conducted individual interviews to answer Research Question 3 (What are middle and high school teachers' perceptions of their own pedagogy in mathematics as it relates to at-risk students' motivation?). Through data analysis of the interview transcripts, the researcher found that, overall, middle school and high school mathematics teachers perceived at-risk students as unmotivated and lacking support at home but felt compassionate about assisting at-risk students to be successful in mathematics. Middle school and high school teachers perceived teacher and student relationships had the biggest impact on student motivation and success in mathematics. The researcher also found that middle school and high school teachers believed showing students you care and building relationships with students increased student confidence and success in mathematics. Additionally, the researcher discovered middle school and high school teachers believed hands-on learning, such as manipulatives and learning games, was the best instructional strategy for increasing at-risk students' motivation and academic success in mathematics.

As an experienced mathematics teacher of at-risk middle and high school students, the current study was significant to determine teachers' perceptions of instructional strategies to assist future educators when teaching mathematics. The researcher gained information about teachers' perceptions of at-risk student motivation in mathematics and a variety of factors that mathematics teachers perceive have affected student motivation. The researcher gained information regarding motivational instructional strategies that may be used to help students achieve academic success when teaching mathematics education courses.

Conclusion

The current study was conducted to gain information on the relationship between mathematics teachers' perceptions of student motivation and their use of instructional strategies for at-risk math students. The researcher focused on teachers' attitudes and perceptions, as well as instructional strategies used in successful mathematics classrooms, as indicated in the literature. Through quantitative data analysis, the researcher gained information regarding middle and high school mathematics teachers' perceptions of at-risk students' motivation, and instructional strategies used most often in middle and high school mathematics teachers' classrooms. After examining qualitative data from one-on-one interviews, the researcher determined teachers' perceptions of their own pedagogy in mathematics, as it relates to at-risk students. The researcher found that middle and high school mathematics teachers perceive relationships with students are the single most important factor for increasing at-risk student motivation in mathematics. Secondly, middle and high school mathematics teachers viewed verbal praise and rewards as an important way to increase student motivation and engagement and show students that teachers care about them. Hands-on instructional strategies, such as learning games and manipulatives, were the instructional strategies mentioned by participants the most during interviews. In closing, the current study enlightened the researcher about middle and high school mathematics teachers' perceptions of at-risk students and the strategies that they used to promote at-risk students' academic and personal success.

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APPENDICES

Appendix A

Perceptions of At-Risk Students' Motivation Survey

Instructions:

For the following questions, consider how accurate each statement is, in general, for the at-risk students in your class. Students considered to be "at-risk" are those students who have a greater chance of not achieving success in school, failing or quitting school. Factors used to determine if a student is at-risk are wide ranging and often involve issues outside of educators' control, such as health issues or socio-economic status (Georgia Department of Education, 2011; Great Schools Partnership, 2014).

Respond by selecting how accurate each statement is from your perspective, using the following response scale:

(5) Strongly agree, (4) Agree, (3) Neither agree nor disagree, (2) Disagree, (1) Strongly disagree

1. My at-risk students put forth effort to learn new concepts.

   ☐ Strongly Agree ☐Agree ☐ Neither agree nor disagree ☐Disagree ☐ Strongly disagree

2. My at-risk students are usually unfocused and must be reminded to pay attention or finish the classwork.

   ☐ Strongly Agree ☐Agree ☐ Neither agree nor disagree ☐Disagree ☐ Strongly disagree

3. My at-risk students are very engaged in content related tasks.

   ☐ Strongly Agree ☐Agree ☐ Neither agree nor disagree ☐Disagree ☐ Strongly disagree

4. My at-risk students display minimal effort at school.

   ☐ Strongly Agree ☐Agree ☐ Neither agree nor disagree ☐Disagree ☐ Strongly disagree

5. My at-risk students are more motivated to learn if the content makes a real-world connection to their everyday life.

   ☐ Strongly Agree ☐Agree ☐ Neither agree nor disagree ☐Disagree ☐ Strongly disagree

6. My at-risk students are not planning on furthering their education.

   ☐ Strongly Agree ☐Agree ☐ Neither agree nor disagree ☐Disagree ☐ Strongly disagree

7. My at-risk students' motivation is affected by the desire to be accepted by their peers.

   ☐ Strongly Agree ☐Agree ☐ Neither agree nor disagree ☐Disagree ☐ Strongly disagree

8. My at-risk students lack the ability to be self-motivated.

   ☐ Strongly Agree ☐Agree ☐ Neither agree nor disagree ☐Disagree ☐ Strongly disagree

9. My at-risk students feel confident in their academic abilities.

   ☐ Strongly Agree ☐Agree ☐ Neither agree nor disagree ☐Disagree ☐ Strongly disagree

10. My at-risk students try to achieve their academic goals.

    ☐ Strongly Agree ☐Agree ☐ Neither agree nor disagree ☐Disagree ☐ Strongly disagree

11. My at-risk students lack support at home.

    ☐ Strongly Agree ☐Agree ☐ Neither agree nor disagree ☐Disagree ☐ Strongly disagree

12. My at-risk students have high self-esteem.

    ☐ Strongly Agree ☐Agree ☐ Neither agree nor disagree ☐Disagree ☐ Strongly disagree

13. My at-risk students' parents attend conferences at the school.

    ☐ Strongly Agree ☐Agree ☐ Neither agree nor disagree ☐Disagree ☐ Strongly disagree

14. My at-risk students are usually focused and complete classwork.

    ☐ Strongly Agree ☐Agree ☐ Neither agree nor disagree ☐Disagree ☐ Strongly disagree

15. My at-risk students strive to perform well in front of their peers.

    ☐ Strongly Agree ☐Agree ☐ Neither agree nor disagree ☐Disagree ☐ Strongly disagree

16. My at-risk students want to be successful in school.

    ☐ Strongly Agree ☐Agree ☐ Neither agree nor disagree ☐Disagree ☐ Strongly disagree

Demographic Information

17. What is the highest degree(s) you have received?

    _____

18. In what area did you receive your degree(s)?

    _____

19. What grade level are you currently teaching?

    _____

20. What subject(s) are you currently teaching?

_____

21. How many gifted classes are you currently teaching?

_____

Perceptions of At-Risk Students' Motivation Survey Coding Scale

Question Topic	Question Number
Motivation	8, 16
Effort	1, 4
Participation	2, 14
Interest/Relevance	3, 5
Family Life	11, 13
Ambition	6, 10
Peer Influence	7, 15
Self-Esteem	9, 12

Appendix B

Instructional Strategies Survey

Instructions:

For the following questions, consider how often you use each instructional strategy in your classroom. Instructional strategies are procedures used by educators to assist learners in mastering content knowledge and becoming life-long learners (D'Elisa, 2015; Jung, 2014).

Respond by selecting how accurate each statement is from your perspective, using the following response scale:

(5) Always, (4) Very Often, (3) Sometimes, (2) Rarely, (1) Never

1. I connect the mathematics curriculum with real-world experiences.

☐ Always ☐ Very Often ☐ Sometimes ☐ Rarely ☐ Never

2. I relate the mathematics curriculum to students' interests and everyday lives.

☐ Always ☐ Very Often ☐ Sometimes ☐ Rarely ☐ Never

3. I engage students in verbal communication in mathematics.

☐ Always ☐ Very Often ☐ Sometimes ☐ Rarely ☐ Never

4. I encourage the use of appropriate mathematical vocabulary.

☐ Always ☐ Very Often ☐ Sometimes ☐ Rarely ☐ Never

5. I offer my students opportunities to participate in collaborative learning activities.

☐ Always ☐ Very Often ☐ Sometimes ☐ Rarely ☐ Never

6. I use concrete manipulatives as a visual representation.

☐ Always ☐ Very Often ☐ Sometimes ☐ Rarely ☐ Never

7. I use mathematics-related games to assist students in learning content.

☐ Always ☐ Very Often ☐ Sometimes ☐ Rarely ☐ Never

8. I use stories, songs, and/or rhymes to teach mathematical concepts.

☐ Always ☐ Very Often ☐ Sometimes ☐ Rarely ☐ Never

9. I use teacher directed learning, such as teacher lecture in my mathematics class.

☐ Always ☐ Very Often ☐ Sometimes ☐ Rarely ☐ Never

10. I establish mathematics learning goals to help guide and structure lessons.

☐ Always ☐ Very Often ☐ Sometimes ☐ Rarely ☐ Never

11. I provide tasks that encourage reasoning and problem solving.

☐ Always ☐ Very Often ☐ Sometimes ☐ Rarely ☐ Never

12. I allow students to compare their understanding by sharing their ideas of mathematics with one another.

☐ Always ☐ Very Often ☐ Sometimes ☐ Rarely ☐ Never

13. I use purposeful questions to assess students' understanding of mathematical concepts.

☐ Always ☐ Very Often ☐ Sometimes ☐ Rarely ☐ Never

14. I use technology such as Kahoot, Quizizz, USA Test Prep, Google Classroom, or electronic whiteboards for teaching mathematics.

☐ Always ☐ Very Often ☐ Sometimes ☐ Rarely ☐ Never

15. I use student data to adjust instruction as needed.

☐ Always ☐ Very Often ☐ Sometimes ☐ Rarely ☐ Never

16. I provide students with feedback to clear up misconceptions.

☐ Always ☐ Very Often ☐ Sometimes ☐ Rarely ☐ Never

17. I give homework at least three times a week.

☐ Always ☐ Very Often ☐ Sometimes ☐ Rarely ☐ Never

18. I follow the pacing guide closely.

☐ Always ☐ Very Often ☐ Sometimes ☐ Rarely ☐ Never

19. I use the textbook as a guide for planning instruction.

☐ Always ☐ Very Often ☐ Sometimes ☐ Rarely ☐ Never

20. I use learning through movement to help students focus in my mathematics class.

☐ Always ☐ Very Often ☐ Sometimes ☐ Rarely ☐ Never

21. I use a worksheet to reinforce mathematical concepts.

☐ Always ☐ Very Often ☐ Sometimes ☐ Rarely ☐ Never

22. I use graphic organizers to visually display mathematical concepts.

☐ Always ☐ Very Often ☐ Sometimes ☐ Rarely ☐ Never

23. I use multiple representations to represent mathematics concepts, such as words, equations, tables, and graphs.

☐ Always ☐ Very Often ☐ Sometimes ☐ Rarely ☐ Never

24. I allow students to use technology, such as calculators and virtual manipulatives to practice mathematics.

☐ Always ☐ Very Often ☐ Sometimes ☐ Rarely ☐ Never

*If you use an instructional strategy(s) that is not listed here and would like to share, please comment below. Describe the strategy(s) and state how often you use this strategy when teaching mathematics.

_____

_____

_____

Instructional Strategies Survey Coding Scale

Question Topic	Question Number
Communication	3, 4, 16
Interest/Relevance	1, 2
Collaborative learning	5, 12
Interactive learning	7, 8, 20
Visual Representations	6, 22
Critical thinking	11, 23
Technology	14, 24
Assessment	13, 15
Planning/Preparation	10, 18, 19
Traditional Methods	9, 17, 21

Appendix C

Interview Protocol

Interviewee Name:		Date:
Start Time:	End Time:	Audio tape number:

Materials Needed

- *Clock*
- *2 tapes for recorder*
- *2 tape recorders*
- *Interview guide*
- *Clipboard and pen for notes*
- *Do Not Disturb sign for door*

Consent Process

Each of the participants received a written request and consent to gain permission to conduct an interview with open-ended questions and received a copy of the interview questions. Within the written request, the participants were informed that their identity would remain confidential throughout the study. All information provided during the interview will be completely confidential.

Interviews will take place in the conference room in March 2019 and should be completed within 30 minutes.

Introduction

First, I would like to say thank you for taking time to meet with me. I am conducting research regarding middle and high school teachers' perceptions of their own pedagogy in mathematics as it relates to at-risk students' motivation. As a former middle and high school mathematics teacher of at-risk students, I am very interested in best practices and teaching strategies used within the classroom, and how those strategies or practices play a part in at-risk students' motivation in mathematics. I look forward to sharing my findings with other educators.

Before we begin the interview, I would like to remind you that your identity will remain confidential and all information obtained during this interview is confidential. At any time during the interview, if you would like to take a break, please let me know. Also, if I ask a question that you do not feel comfortable answering, just say, "I would rather not answer," and I will not ask that question again.

The interview should last about thirty minutes. I will use a tape recorder to audio record the interview. A third-party vendor will transcribe the interview and then I will provide you with a copy of the transcript. After receiving your copy, review the transcript for accuracy. If you notice any corrections need to be made, please inform me within one week of receiving your copy.

Do you have any questions for me? When you are ready, I will turn on the audio recorder.

Turn on tape recorder

Begin Interview
Remember to give interviewee plenty of time to answer. Use probing questions to redirect when needed.

Topic 1

Students who are considered to be "at-risk" are those students who have a greater chance of not achieving success in school, failing or quitting school. There are many factors used to determine if a student is considered to be at-risk, and often involves issues outside of school, such as health issues or socio-economic status.

1. Describe your experience in working with at-risk students.
2. Describe your experiences with student motivation in at-risk students.
3. Tell me about your at-risk students' motivation toward mathematics.

Probes:

Can you provide an example of working with at-risk students?
Can you provide an example of difficulties your at-risk students faced in mathematics?
Is there any assistance or intervention in place for your at-risk students, outside of your classroom?

Topic 2

Instructional strategies are procedures used by educators to assist learners in mastering content knowledge and becoming life-long learners.

4. Please describe instructional strategies that you have previously used in a mathematics class that has improved student learning and motivation.
5. How do you know that this practice improved motivation in at-risk students?
6. Are there other instructional strategies that you have used in the past that, in your opinion, increased student motivation? Would you describe them?
7. What advice would you give new teachers about working with at-risk students in mathematics?

Probes:

Describe a strategy that you feel works best for at-risk students.
Can you provide an example of using a strategy that sparked motivation in at-risk students?
Can you provide an example of a situation when one strategy may be beneficial for some students, but other students benefitted from a different type of strategy? For example, different strategies for different class periods?

Closing Questions

8. Is there any additional information you would like to add to the discussion?

Thank you for your time. I appreciate you sharing your responses and experiences.

Turn off tape recorder. Remove sign from door

Appendix D

IRB Approval Letter

COLUMBUS STATE UNIVERSITY

Kayla Couch <couch_kayla@columbusstate.edu>

Protocol 19-085 Exempt Approval

CSU IRB <irb@columbusstate.edu> Wed, Aug 14, 2019 at 9:55 AM
To: Kayla Couch <couch_kayla@columbusstate.edu>, Marguerite Yates <yates_helen@columbusstate.edu>
Cc: CSU IRB <irb@columbusstate.edu>, Institutional Review Board <instituional_review@columbusstate.edu>

Institutional Review Board
Columbus State University

Date: 08/14/2019
Protocol Number: 19-085
Protocol Title: The relationship between mathematics teachers' perceptions of student motivation and their use of instructional strategies for at-risk math students.
Principal Investigator: Kayla Couch
Co-Principal Investigator: Margie Yates

Dear Kayla,

The Columbus State University Institutional Review Board or representative(s) has reviewed your research proposal identified above. It has been determined that the project is classified as exempt under 45 CFR 46.101(b) of the federal regulations and has been approved. You may begin your research project immediately.

Please note any changes to the protocol must be submitted in writing to the IRB before implementing the change(s). Any adverse events, unexpected problems, and/or incidents that involve risks to participants and/or others must be reported to the Institutional Review Board at irb@columbusstate.edu or (706) 507-8634.

If you have further questions, please feel free to contact the IRB.

Sincerely,

Manasa Mamidi, Graduate Assistant
Institutional Review Board
Columbus State University

*** Please note that the IRB is closed during holidays, breaks, or other times when the IRB faculty or staff are not available. Visit the **IRB Scheduled Meetings** page on the IRB website for a list of upcoming closures. ***

Appendix E

Letter of Cooperation

Date: April 18, 2019

Re: Letter of Cooperation for [redacted] School

Dear Kayla Couch,

This letter confirms that I, as an authorized representative of [redacted] School, allow you access to conduct study related activities at the listed site, as discussed with you and briefly outlined below, and which may commence when you provide evidence of IRB approval for the proposed project.

- **Research Site(s)**: [redacted] **School**
- **Study Purpose:** The purpose of this study was to determine teacher perceptions of at-risk students' motivation in mathematics education and teacher perceptions of their own pedagogy in mathematics education. This study focused on middle school and high school mathematics teachers of predominantly low socio-economic status students who were enrolled in a Title 1 school in a rural South Georgia community.
- **Study Activities:** The researcher administered two surveys at the end of a weekly math meeting. Before participants entered the meeting room, laptops were open, and surveys were set up on the screen. Snacks and water were also provided for participants. After all participants were present in the meeting room and the weekly meeting ended, the researcher explained the purpose of the study, the directions for the survey, and that each participant's identity would remain confidential. To ensure trustworthiness of data, participants were asked to complete the survey without discussing the survey with other participants in the room. Participants completed the survey on SurveyMonkey and granted consent to participate in the study on SurveyMonkey before starting the survey. The researcher stepped out of the room for participants to complete the survey and returned to the room after approximately 15 minutes. From the sample of math teachers who completed the surveys, a smaller sample of four to six middle school teachers were chosen to participate in individual interviews. Interviews took place in a conference room on site with a "Please do not disturb" sign placed on the door. Two tape recorders were used to record the interview and were placed on the table between the researcher and the participant. The researcher used an interview protocol to assist in the semi-structured interview process.
- **Subject Enrollment:** For this study, the researcher focused on all middle and high school mathematics teachers and then narrowed the sample after administering the survey by identifying the teachers' years of experience and classes currently teaching. The research questions for this study referred to middle and high school mathematics teachers. Therefore, the participants were middle and high school mathematics teachers in a rural South Georgia

school district. All 9 middle and 9 high school mathematics teachers within the school district were asked to complete the quantitative surveys. Participants were sorted into subgroups based on teaching strategies and experience with at-risk students. Using the information from the subgroups of teachers by teaching strategies, four teachers from the middle school and four teachers from the high school were selected. For this study, the researcher analyzed the sample's years of experience from the demographic information provided on the survey, and then disaggregated the data to determine numbers of years of experience to classify participants as novice or experienced.

- **Site(s) Support**: [redacted] School provided the study site for administering surveys and conducting interviews. For survey administration, mathematics teachers completed the survey during the mathematics department meeting. Interviews were conducted in the front office conference room.
- **Data Management:** Two surveys were administered, and individual interviews were conducted. The first survey instrument gathered data on teacher's perceptions of at-risk students' motivation through 16 survey questions and demographic questions. The second survey required participants to respond to 24 survey items by identifying the instructional strategies used in their mathematics class and the frequency of use for each instructional strategy. Lastly, individual interviews were conducted to determine middle and high school teachers' perceptions of their own pedagogy in mathematics as it relates to at-risk students' motivation. Survey data was password protected on SurveyMonkey when collected and password protected when analyzed on SPSS computer software. Interview data was transcribed by a third party. Names were not included on the data sent to the third-party transcriber.

- **Anticipated End Date:** All interviews and surveys were concluded by October 2019.

We understand that this site's participation will only take place during the study's active IRB approval period. All study related activities must cease if IRB approval expires or is suspended.

Our organization agrees to the terms and conditions stated above. If we have any concerns related to this project, we will contact the researcher, Kayla Couch. For concerns regarding IRB policy or human subject welfare, we may also contact the Columbus State University IRB (see https://aa.columbusstate.edu/research/irb/).

Regards,

Signature	***Date Signed***
Full Name	***Job Title***

Appendix F

Informed Consent

COLUMBUS STATE UNIVERSITY

INSTITUTIONAL REVIEW BOARD

Informed Consent Form

You are being asked to participate in a research project conducted by Kayla Couch, a Doctoral Student in the College of Education and Health Professions at Columbus State University. Dr. Margie Yates, Director of Graduate Studies, at Columbus State University is supervising the research project.

I. Purpose:

The purpose of this project is to determine teacher perceptions of at-risk students' motivation in mathematics education and teacher perceptions of their own pedagogy in mathematics education. The project focuses on the perceptions of middle school and high school mathematics teachers. Surveys will be administered to determine teacher perceptions of student motivation of at-risk students and instructional strategies used by mathematics teachers. Individual interviews will be conducted to determine teacher perceptions of their own pedagogy while teaching mathematics.

II. Procedures:

1. The researcher will attend the weekly math department meetings at the middle school and high school to describe the research project and request participation.
2. Surveys will be conducted at the end of the weekly math department meeting.
3. At the beginning of the web-based survey will be a consent form for the research project. The participants will select whether they agree or disagree to participate in the research project. If they disagree, the survey will close, and the reply will be documented. If they agree, they will continue to complete the survey. The survey should not take longer than 30 minutes.
4. Survey response data will be analyzed through computer software.
5. After surveys are completed, the researcher will ask four participants in person to complete individual interviews. The researcher and participant will schedule the interview date and time together.
6. The researcher will conduct semi-structured individual interviews in the school's front office conference room. Each interview will last approximately 30 minutes. The researcher will use an audio recorder to gather data from the interview. Before the interviews begin, the participant will sign another informed consent form.
7. A third party will transcribe the audio recordings from the interviews.
8. The researcher will manually code the interview data based on similar themes that appear among the participants' responses.
9. Data obtained during the research project may be utilized for future research projects.

III. Possible Risks or Discomforts:

There is no physical or psychological risks and no deceptive technique will be used. Social or economic risks will be no more than minimal risk for the participant.

IV. Potential Benefits:

Revised 10/01/2017

The anticipated benefits of this study could impact mathematics teachers, school improvement specialists, curriculum and development specialists and preservice teacher education program developers. Mathematics educators and all individuals involved in educating students can benefit from gaining knowledge regarding student motivation toward learning mathematics, which may increase student achievement. The results of the study may encourage mathematics teachers to reflect upon current instructional practices and determine strategies, which are best suited for at-risk students. Additionally, teacher preparation programs can benefit from gaining knowledge regarding student motivation and interest for learning. Pre-service teachers may gain confidence knowing best practices and instructional strategies utilized to increase student motivation and desire to learn.

V. Costs and Compensation:

There are no costs or compensation benefits for the participants.

VI. Confidentiality:

Data will be stored electronically on a password protected computer kept at the researcher's home and on a password protected backup flash drive. Data will be deleted after 5 years. The researcher will be the only one to have access to any identifiable information.

VII. Withdrawal:

Your participation in this research study is voluntary. You may withdraw from the study at any time, and your withdrawal will not involve penalty or loss of benefits.

For additional information about this research project, you may contact the Principal Investigator, Kayla Couch at 229-395-1227 or couch_kayla@columbusstate.edu. If you have questions about your rights as a research participant, you may contact Columbus State University Institutional Review Board at irb@columbusstate.edu.

I have read this informed consent form. If I had any questions, they have been answered. By selecting the *I agree* radial and *Submit*, I agree to participate in this research project.

○ I agree. ○ I do not agree.

Submit

Revised 10/01/2017