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The Relationship of Learner-Centered Beliefs of Eighth-Grade Math Teachers and Student Achievement on the North Carolina End-of-Grade Mathematics Test

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by
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Approval Page

This dissertation was submitted by Takeda Lasha LeGrand under the direction of the persons listed below. It was submitted to the Gardner-Webb University School of Education and approved in partial fulfillment of the requirements for the degree of Doctor of Education at Gardner-Webb University.

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Abstract

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Educators are charged with reform efforts to improve student achievement. Most efforts focus on accountability reform. The learner-centered model for school reform is organized around the personal domain for systemic reform. How teachers work with students is greatly influenced by policy and what they believe about student learning and behavior. Subsequently, teacher behaviors, beliefs, and practices impact learning. This dissertation attempted to establish teacher beliefs and their effectiveness on student achievement on the eighth-grade End-of-Grade Mathematics Test in the State of North Carolina.

This study was conducted within the Sandhills Regional Education Consortium located in the central part of North Carolina. As of the 2011 school year, 12 school districts made up the Sandhills Regional Education Consortium; 5 of the twelve districts participated in this research study.

A non-experimental quantitative study design was used to examine teachers' beliefs about the learner, learning, and teaching as well as the impact of their beliefs on student mathematics achievement. The researcher collected data via the Teacher Beliefs Survey, a demographic questionnaire, and student achievement on the eighth-grade 2011 North Carolina End-of-Grade Mathematics Test for the purpose of this research.

Data collected revealed that only 1 teacher met McCombs and Whisler's criteria for having learner-centered beliefs and 2 teachers were identified as non-learner-centered. There was no statistical significant difference between teacher beliefs and student achievement on the eighth-grade End-of-Grade Mathematics Test, but there was a difference in teachers' beliefs about non-learner-centered ideas in higher-performing districts than teachers' beliefs about non-learner-centered ideas in lower-performing districts, but not enough to be considered significant.

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Chapter 1: Introduction

National Reform Efforts

Education reform is rooted in the standards movement. Chiefly, standards serve to clarify and raise expectations, as well as provide a common set of expectations (Mid-continent Research for Education and Learning [McREL], 2011). For this reason, *A Nation at Risk* serves as the primary initiator of the current standards movement (National Commission on Excellence in Education [NCEE], 1983). Present reform efforts reference the *Nation at Risk* report by stating:

> The educational foundations of our society are presently being eroded by a rising tide of mediocrity that threatens our very future as a nation and a people . . . We have, in effect been communicating an act of unthinking, unilateral education disarmament. (NCEE, 1983, p. 5)

In 1990, former President George Bush announced the National Education Goals for 2000. As a result, six broad goals for education, to be reached by 2000, were developed. Particularly, Goals 3 and 4 focused on mathematics achievement. Goal 3 proposed that by the year 2000, American students should leave Grades 4, 8, and 12 having demonstrated competency in challenging subject matter including English, mathematics, science, history, and geography; Goal 4 required that by the year 2000, U.S. students should be the first in the world in science and mathematics achievement (National Education Goals Panel, 1991).

The Secretary's Commission on Achieving Necessary Skills (SCANS) determined the skills employers desired from employees and drew attention to mathematics achievement on America's economic threat (McREL, 2011). By the same

token, former President George W. Bush signed the No Child Left Behind Act of 2002 into law. In 2002, the United States Congress signed Public Law 107-110, the No Child Left Behind (NCLB) Act of 2002, into law. NCLB was the reauthorization of the 1965 Elementary and Secondary Education (ESEA) Act. The purpose of the NCLB Act was to close the achievement gap by increasing accountability, flexibility, and choice in public schools (U.S. Department of Education, 2010). The Act concentrated on improving all public schools, as well as ensuring all students had access to a quality education. Moreover, efforts targeted accountability, school choice, flexibility in funding, and literacy (U.S. Department of Education, 2010).

In February of 2009, President Barack Obama signed the American Recovery and Reinvestment Act of 2009 into law. The Act prioritized funding for stimulation of the economy, job creation, and education. As a result, Race to the Top received $4.35 billion for education reform efforts (U.S. Department of Education, 2009).

Race to the Top focused on four core education reform areas: (a) Adopting standards and assessments that prepare students to succeed in college and the workplace and to compete in the global economy; (b) Building data systems that measure student growth and success, and inform teachers and principals about how they can improve instruction; (c) Recruiting, developing, rewarding, and retaining effective teachers and principals, especially where they are needed most; and (d) Turning around our lowest-achieving schools (U.S. Department of Education, 2009).

Race to the Top prioritized an emphasis on Science, Technology, Engineering, and Mathematics (STEM), and on school-level conditions for reform. In essence, school-level conditions such as creating climates and cultures that remove obstacles to learning

and actively supporting student engagement and achievement directly impact the classroom level (U.S. Department of Education, 2009). As a result, Science, Technology, Engineering, and Mathematics (STEM) academies and learning communities are increasing in America's schools. The Bill and Melinda Gates foundation has invested heavily in smaller learning communities (National Evaluation of High School Transformation, 2005). According to the U.S. Department of Education (2000), four critical reasons our children must achieve in mathematics and science are (a) The demands of our changing economy and workforce; (b) Our government need for a competent citizenry; (c) The link between mathematics and science to our nation's security; and (d) The deeper value of mathematical and scientific knowledge in the preservation of our history.

North Carolina Reform Efforts

All public schools in America must measure and report Adequate Yearly Progress (AYP) (U.S. Department of Education, 2010). Accountability efforts have focused on ensuring that schools make (AYP) and nurture teacher effectiveness. AYP measures the yearly progress of different groups of students against yearly targets in reading/language arts and mathematics. The groups of students are identified via grade level and in the following ways: (a) The school as a whole, (b) White, (c) Black, (d) Hispanic, (e) Native American, (f) Asian, (g) Two or more Races, (h) Economically Disadvantaged Students, (i) Limited English Proficient Students, and (j) Students with Disabilities (U.S. Department of Education, 2010).

The End-of-Grade (EOG) Mathematics test is administered to students in grades 3-8 to determine if elementary and middle schools in North Carolina make AYP. North

Carolina State Board of Education school reform efforts for schools that do not make AYP include corrective action, restructuring, school choice, and supplemental educational services. These actions focus on professional development, instruction, curriculum, management, supplemental education, and school options, all which address the technical and organizational domains for systemic reform (Public Schools of North Carolina State Board of Education/Department of Public Instruction, 2011).

During the 2010-2011 school year, North Carolina students as a whole in grades 3-8 did not meet AYP (Public Schools, 2011). Unfortunately, several years after the enactment of the NCLB Act of 2001, the mathematics achievement gap still existed (Blank, 2011).

For almost 30 years, reform efforts have focused on improving the quality of education that students receive and on increasing student achievement levels at both the state and national levels (Fuhrman & Odden, 2001). As a result, the No Child Left Behind Act of 2002 continues to focus on accountability, flexibility, and choice (U.S. Department of Education, 2010); however, the act is neither a comprehensive nor a holistic reform model.

Learner-centered principles have been validated in educational psychology as a means for improving learning communities for learner and teacher (American Psychological Association [APA], 1993, 1997). The American Psychological Association developed the Learner-Centered Psychological Principles as a framework for school reform that focuses on the often-neglected personal domain (APA, 1993, 1997).

Currently, the North Carolina State Board of Education and the Department of Instruction’s efforts to increase all student achievement levels based on the mandates

required by NCLB Act of 2002 largely address the technical and organizational domains of the educational system. Yet the personal domain, consisting of teacher beliefs about their practices as a reflection tool as well as teacher expectations, is in need of further study.

Mathematics Performance

The acquisition of math skills in middle school is the foundation for mathematics success in high school and post-secondary learning (Riley, 1997). The National Assessment of Education Progress (NAEP) is the largest national study on what students in the United States know and can do in a variety of academic areas and has been administered for over 42 years (National Center for Education Statistics [NCES], 2011a). Accordingly, the 2011 NAEP in Mathematics report collected data from 175,200 eighth graders in the United States. Public and charter schools in all 50 states, the District of Columbia, and the Department of Defense participated. NAEP assessed the following mathematical areas: number properties and operations, measurement, geometry, data analysis, statistics, probability, and algebra. Subsequently, performance in these areas was categorized into three achievement levels: basic, proficient, and advance. In essence, basic denotes partial mastery with an emphasis on recall and understanding. Proficient denotes mastery of mathematics concepts, particularly at the application level. Advance denotes superior performance, with attention to synthesizing information (NCES, 2011c).

Participants' results are based on a 0-500 scale score reported at five percentile intervals (NCES, 2011c). The use of percentiles is useful for determining the percentage of students scoring at or below the scale score (Fraenkel & Wallen, 2006). Between 2009 and 2011, students performing at the proficient and advance levels significantly

increased; on the contrary, students performing at the basic level did not significantly improve in their performance (NCES, 2011c).

Conversely, low-performing students, who are minority and receive free/reduced lunch, are continuing to perform inadequately when compared to their white counterparts. The achievement gap in mathematics is still present (NCES, 2011c).

This gap extends beyond the students within the United States. Hence, when the Program for International Student Assessment (PISA) 2009 report compared the United States with Canada, France, Germany, Italy, Japan, Russian Federation, and the United Kingdom, the United States ranked third in math achievement. Also, the percentage of United States top performing math students only scored significantly higher than one other country—Russian Federation (NCES, 2011b). Minority children tend to perform lower in mathematics when compared to their white counterparts (NCES, 2011a) and college students say that there is a need to improve the quality of instruction students receive in math during high school years (Thompson & Joshua-Shearer, 2002).

Students enrolled in public schools in North Carolina are not immune to the mathematics achievement gap. Particularly, this achievement gap is evidenced by the fact that North Carolina public schools did not make AYP in mathematics for students in grades 3-8 for the 2010-2011 school year (Public Schools, 2011).

Organizational Domains of Change

In 1997 the Researchers at the Mid-continent Regional Educational Laboratory (McREL) identified and organized systemic reform around three primary domains of educational systems: personal, technical, and organizational (McCombs & Whisler, 1997). The identified personal domains focused on understanding the keys to motivation

to learn, classroom interactions and achievement, and increasing parental involvement. The technical domain addressed classroom management, technology literacy, curriculum and instruction, and standards-based curriculum. The organizational domain included policies and procedures for management structures and management of systemic reform (McCombs & Whisler, 1997).

In part, as a response to the lack of attention to the psychology of learning, the APA and the researchers at McREL developed a framework for addressing the personal domain of school redesign and reform. The original framework consisted of 12 learner-centered principles; however, today the framework consists of 14 learner-centered principles that are categorized into four domains (APA, 1993, 1997).

The four research-validated domains are (a) metacognitive and cognitive factors, (b) affective and motivational factors, (c) developmental and social factors, and (d) individual difference factors (APA 1993, 1997).

Definition of Learner-Centered

In the original research by the APA Task Force (1993), McCombs and Whisler (1997) published the following definition of learner-centered:

> Learner-centered is the perspective that couples a focus on individual learners-their heredity, experiences, perspectives, backgrounds, traits, talents, interests, capacities, and needs-with a focus on learning-the best available knowledge about learning and how it occurs and about teaching practices that are most effective in promoting the highest levels of motivation, learning, and achievement for all learners. (p. 42)

Furthermore, learner-centeredness is a complex interaction of teacher qualities in

combination with characteristics of instructional practices, as perceived by individual learners. Therefore, the quality of learner-centeredness does not reside in programs or practices. Accordingly, learner-centered clarifies what teachers need to know, do, and be (i.e., beliefs, practices, and dispositions) to create a positive learning environment (McCombs & Lauer, 1997; McCombs & Whisler, 1997).

The learner-centered framework offers a highly successfully alternative to current school reform efforts by combining the best available knowledge on what supports a positive learning environment and what promotes change for people within the system (McCombs, 2003a). Specifically, the Learner-Centered Model provides a framework for balancing learner needs with current research on the learning process (APA, 1997).

The Learner-Centered Model is a meta-model for implementing and evaluating both programs and practices at multiple levels throughout the education system. The Learner-Centered Model is illustrated with diverse utility via the classroom, school, and district levels, as well as from personal beliefs to practice (APA, 1997). As reform policies attempt to address achievement deficiencies, teachers must embrace the current research on learners and learning as evidenced by the research-validated principles defined by the APA's Learner-Centered Psychological Principles (APA, 1997).

The Learner-Centered Battery (LCB) evolved from the learner-centered principles (McCombs & Lauer, 1997). The Learner-Centered Battery, theoretical and research-based, is the direct result of the Learner-Centered Psychological Principles (APA, 1993, 1997) and measures the following aspects: (a) teachers' beliefs about learners, learning, teaching, (b) teachers' perceptions of their classroom practices in domains of practice identified in the Learner-Centered Psychological Principles, and (c) students' perceptions

of teacher classroom practices in the four research-validated domains (Fasko, Grubb, Jesse, & McCombs, 1997).

A majority of the attention given to all reforms focused on technical and organizational domains, not the personal domain. Accordingly, the Learner-Centered Model validates the human element in education and reaffirms the impact of teacher beliefs and perceptions on learning and motivation (McCombs & Vakili, 2005). Currently, school reform efforts in North Carolina minimally address this personal domain. Therefore, this study sought to both identify and examine teacher beliefs and their impact on student achievement.

Statement of the Problem

Despite previous and current reform efforts and initiatives, mathematics achievement in North Carolina has not been significantly improved.

Limitations

Chiefly, a limitation of this study was the design. This study was a causal comparative research study designed to examine relationships, not cause and effect. Furthermore, causal comparative research investigates the possibility of relationships; on the other hand, other alternatives may explain relationships found in the data. Significant findings served as a first step for identifying variables for further study (Fraenkel & Wallen, 2006).

Delimitations

A potential delimitation of this study was in the selection of schools. Accordingly, the researcher selected schools from five districts (n = 5) within the Sandhills Regional Education Consortium located in the central part of North Carolina and focused on the

eighth-grade End-of-Grade Mathematics Scores for 2011.

Overview of Chapters

Chapter 2 includes a review of the literature that describes previous research akin to the intended aim of this study. Specifically, the review of literature illustrates a structure designed in concert with the three levels of research described by Ellis and Fouts (1993). The levels of research are (a) the theoretical basis of learner-centered beliefs, (b) the practical research on learner-centered beliefs as it relates to the student achievement, and (c) research conducted to assess the overall outcome of learner-centered beliefs and student achievement. Chapter 2 analyzes teacher beliefs and expectations, student achievement, and teacher effectiveness; the three levels of research arranged this component too. The review of literature ends with rationale for this study.

Chapter 3 exemplifies the methodology applied in this study. Chapter 4 reports the results of descriptive and inferential statistics as well as their analyses. Chapter 5 analyzes and discusses the results and summarizes the study with recommendations for further investigation.

Definition of Terms

Adequate Yearly Progress (AYP): Measures the yearly progress of different groups of students at the school, district, and state levels against yearly targets in reading/language arts and mathematics.

End-of-Grade Test (EOG): Tests designed to measure student performance on the goals, objectives, and grade-level competencies specified in the North Carolina Standard Course of Study.

Learner-Centered: The perspective that couples a focus on individual learners, their

heredity, experiences, perspectives, backgrounds, talents, interests, capacities, and needs, with a focus on learning. The best available knowledge is implemented about learning and how it occurs and about teaching practices that are most effective in promoting the highest levels of motivation, learning, and achievement for all learners. Learner-centered is a reflection in practice of the Learner-Centered Psychological Principles.

Learner-Centered Battery (LCB): Measures teachers' beliefs regarding the following: learners, learning, and teaching; teachers' perceptions of their classroom practices in domains of practice identified in the Learner-Centered Psychological Principles and students' perceptions of teacher classroom practices in the following domains; metacognitive and cognitive factors; affective and motivational factors; developmental and social factors; and individual difference factors.

Learner-Centered Principles (LCP): Psychological principles (14) that pertain to the learner and the learning process. The 14 principles are divided into cognitive and metacognitive, motivational and affective, developmental and social, and individual difference factors influencing learners and learning.

No Child Left Behind Act of 2002: The most recent reauthorization of the Elementary and Secondary Education Act of 1965. The reauthorized law added strict new accountability changes and mandated that every child be taught by a Highly Qualified teacher. The law emphasizes new standards for teachers and new consequences for Title I schools that do not meet student achievement standards for two or more consecutive years. The law's major goal is for every school to be at 100% proficiency by 2013-14, as measured by state tests.

Chapter 2: Literature Review

Introduction

Present reform policies, including those identified under the No Child Left Behind (NCLB) Act of 2002, have created conflict between learner-centered and accountability-centered reformers (Sleeter, 2007). Accordingly, learner-centered beliefs education reform has been a popular topic among educators, policymakers, and the public since the report of a *Nation at Risk* in 1983 (McCombs, 2003b).

Increased recognition focuses on the need to address reform based on new knowledge about learning, motivation, and development (McCombs, 2003a). Therefore, after reviewing a century of research on learning, motivation, development, and individual differences, the APA developed the Learner-Centered Psychological Principles (LCPs). The original research identified 12 principles, which was revised as 14 statements in 1997 (APA, 1993, 1997).

Research Overview

The general design of this research utilized the three levels of research identified by Ellis and Fouts (1993) and concludes with sections on Teacher Effectiveness, Purpose Statement, Hypotheses, and Research Questions.

Ellis and Fouts (1993) identified three levels of research that inform education, innovation, and practice presented as Level I, Level II, and Level III. Briefly, Ellis and Fouts (1993) defined Level I research as basic research on learning and utilizing correlations, descriptive data, and qualitative case studies. Level I research is limited to medical or psychological investigation at the clinical level. Level II research tests the actual theory in a classroom setting, often in the form of a comparative study. Level III

research evaluates programs at the school or district level, often in the form of a large-scale comparative study.

As a widely accepted practice, a theory is established as research-based after all three levels of research are conducted (Ellis & Fouts, 1993). Therefore, the three levels of research provide the structure and overall alignment of this literature review.

Evolution of the Learner-Centered Psychological Principles, study of the Learner-Centered Psychological Principles Domains, and educational psychology and student achievement at the basic research level are discussed in the Level I research section. To begin with, research in this section includes the theoretical examination by the American Psychological Association (APA) and Mid-continent Regional Education Laboratory (McREL) Task Force (1993), Albert Bandura (1969, 1977, 1982, 1997), John Keller (1983, 1987), Lezotte and Snyder (2011), Abraham Maslow (1943, 1970), McCombs (1994), McCombs and Lauer (1997), and McCombs and Whisler (1997).

Level II research includes the validation and original results of the instrument constructed to establish and determine learner-centered practices and behaviors of teachers (APA, 1993; McCombs, 1994, 1999, 2003a; McCombs & Lauer, 1997), and student achievement (Meece, 2003; Weinberger & McCombs, 2001; Wenglinsky, 2000). Also, the validation of the Assessment of Learner-Centered Practices tool is discussed. The Assessment of Learner-Centered Practices Survey is an extension of the learner-centered psychological principles and is utilized to address teacher characteristics and beliefs and teacher consistency with learner-centered psychological principles (McCombs, 1999). The work of McCombs (1994, 1999) and McCombs and Lauer (1997) is presented in the Level II research section. Furthermore, studies that measure learner-

centered practices and behaviors on the motivation and academic achievement of students are included in the Level II research section.

The Level III research section provides an explanation of learner-centeredness as part of the learner-centered model for education reform. In essence, learner-centeredness is not a program.

Following the Level III research section is a section on teacher effectiveness. The section includes studies (Eaker, DuFour, & Dufour, 2002; Edmonds, 1979; Ruddell, 1999; Turner, Meyer, Midgley, & Patrick, 2003; Tyler & Boelter, 2008; Weinberger & McCombs, 2001) that demonstrate teacher efficacy, motivation and learning, and student perceptions of teaching and learning.

Lastly, this review of literature summarizes each of the three levels of research defined by Ellis and Fouts (1993) and the current focus on teacher effectiveness and concludes with an argument to specifically study the correlation of learner-centered beliefs and practices with student achievement.

Level I Research

Ellis and Fouts (1993) cited Level I research as basic research on learning and behavior and stated that the purpose of Level I research is to establish a theoretical construct or idea as having some effect on the dependent variable that is caused by the independent variable; generalizations can be made to other groups (Kaufhold, 2007). Therefore, the validity of the learner-centered psychological principles as a construct must be reviewed. For this purpose, this section is categorized into the following topics: (a) A Historical Overview of the Learner-Centered Psychological Principles; (b) Development and Validation Process of the Learner-Centered Psychological Principles;

(c) Educational Psychology and Student Achievement; and (d) Summary of the Learner-Centered Psychological Principles Theoretical Foundation.

A Historical Overview of the Learner-Centered Psychological Principles

In 1990, the American Psychological Association appointed the Presidential Task Force on Psychology in Education. The task force reviewed over a century of research on education. Attention was focused on learning, motivation, development, and individual differences; the Learner-Centered Psychological Principles (LCPs) emerged (APA, 1993, 1997).

Originally, 12 psychological principles, which were revised to 14 statements, were grouped in 4 domains. The four domains are (a) metacognitive and cognitive, (b) motivational and affective, (c) developmental and social, and (d) individual difference factors shown by the research to have significant impacts on student learning, motivation, and achievement in school (APA, 1993, 1997).

The original 12 psychological principles (APA, 1993) and the additional two principles (APA, 1997) communicate the belief that current reform efforts lack the profound knowledge and implementation of teaching and learning based on research from human learning, human motivation, and human development necessary to be effective and enduring (APA, 1993, 1997; McCombs, 2003b; McCombs & Whisler, 1997).

Development and Validation Process of Learner-Centered Psychological Principles

Validation of the LCPs began with a review from experts in the field of psychology, particularly educational, developmental, motivational, social, and cognitive psychology (APA, 1993). Feedback received from a diverse pool of experts (science,

mathematics, teacher educators, and school counselors) warranted revisions to the document. Consequently, five revisions yielded a well-articulated Learner-Centered Psychological Principles document (APA, 1997).

Four domains of learner-centered psychological principles were defined. The first domain, metacognitive and cognitive factors, make up the first six LCPs: (a) The nature of the learning process, (b) Goals of the learning process, (c) The construction of knowledge, (d) Strategic thinking, (e) Thinking about thinking, and (f) Context of learning. Each principle is supported with an exhaustive research base (APA, 1993, 1997; McCombs, 2003a; McCombs & Whisler, 1997). Hence, the first domain research is rooted in constructivist learning, cognitive learning, and higher-order thinking strategies (APA, 1993, 1997; McCombs & Whisler, 1997).

Furthermore, the second domain, motivational and affective factors, consists of three LCPs: (g) Motivational influences on learning, (h) Intrinsic motivation to learn, and (i) Effects of motivation and effort. By the same token, the second domain includes an exhaustive research base similar to the first domain (APA, 1993, 1997; McCombs & Whisler, 1997). Particularly, research was centered on the interrelationship and interaction between intrinsic motivation, learning goals, anxiety, intellectual curiosity, and clinical applications of cognitive approaches (APA, 1993, 1997; McCombs & Whisler, 1997).

The third domain, developmental and social factors, include two LCPs: (j) Developmental influences on learning and (k) Social influences on learning. Following the research base of domains 1 and 2, domain 3 is heavily grounded in both theoretical and clinical research (APA, 1993, 1997; McCombs & Whisler, 1997). Research efforts

targeted developmental psychology and theories of intelligence via physical, social, emotional, and intellectual development (McCombs, 1994).

Subsequently, the fourth domain, individual differences, consists of three LCPs: (l) Individual differences in learning, (m) Learning and diversity, and (n) Standards and assessment. Research in the areas of social constructivism, adaptive instruction, cultural diversity, self-esteem, socio-emotional support, and social psychology are imperative to this domain (APA, 1993, 1997; McCombs & Whisler, 1997).

As a result of the APA (1997) revisions, two additional practices were added to domain four. McCombs (1994) concluded that the research in domain four is derived chiefly from the areas of individual differences as well as social and developmental psychology. Theory about the role of environmental variables, such as previous experiences, belief systems, and capabilities, extends to include linguistic, cultural, and social differences research. Lastly, domain four identifies the integral role of high expectations and the stages of the learning process as central to learner-centered (APA, 1997).

McCombs and Whisler (1997) desired to understand the challenges of failed education reforms, which led to exploration of the implications of the learner-centered principles at both the classroom and school levels. As a result, McCombs and Whisler (1997) organized the learner-centered principles into five premises. They are:

1. Learners are distinct and unique. Their distinctiveness must be addressed and utilized to plan instructional experiences if learners are to engage in and be held accountable for their own learning; 2. Learners' unique differences include their emotional states of mind, learning rates, learning styles, stages of development, abilities, talents, feelings of

efficacy, and other academic and non-academic attributes and needs. Theses must be considered in the construction of learning experiences if all learners are to be provided with the appropriate level for learning and self-development; 3. Learning is a constructive process that occurs optimally when what is being learned is germane and significant to the learner and when the learner is actively involved in constructing his or her own knowledge and understanding by connecting what is being learned with previous knowledge and experience; 4. Learning occurs optimally in a positive climate, one that fosters positive interpersonal relationships, that contains comfort and order, and in which the learner feels valued and esteemed; and 5. Learning is an essential natural process; learners are naturally inquisitive and basically interested in learning about and mastering their world. Negative thoughts and feelings sometimes conflict with the natural learning process and must be addressed, the learner does not require "fixing." (p. 10)

These five premises serve as the theoretical framework of the learner-centered principles (McCombs & Whisler, 1997). The effective schools research on the correlates of effective schools is similar to the traits listed in the five premises (Lezotte & Snyder, 2011). McCombs and Whisler's (1997) premises are established on practical research; however, effective school correlates such as climate of high expectations, opportunity to learn/time on task, safe and orderly environment, and clear and focused mission are guided by widely accepted beliefs about learning, the learner, and the role of the teacher (Lezotte & Snyder, 2011).

Educational Psychology and Student Achievement

Historically, motivation has been a dominant field of study in educational psychology and is viewed as the catalyst for moving a resting organism. Motivation is

often cited by educational psychologists as an indicator of learning (Weiner, 1990). Albert Bandura (1969), John Keller (1983), and Abraham Maslow's (1970) theories on motivation and human learning set precedence for much of our current research on human motivation and learning.

Bandura's (1977) social learning theory identified four components that influence behavior; they are attention, retention, reproduction, and motivation. With attention to motivation, Bandura (1977) suggested that an individual must be motivated by something that individual deems rewarding. Subsequently, the object that serves as a reward acts as a reinforcement (Bandura, 1977).

On the contrary, Bandura disagreed with traditional theorists, Ivan Pavlov, B.F. Skinner, and Edward Thorndike regarding a direct link between behavior (performance) and reinforcement (achievement). He proposed that an individual's cognitive process mediated between behavior and reinforcement (Schultz & Schultz, 2004).

This focus on the cognitive process led to Bandura's (1982) extensive work on self-efficacy. He defined self-efficacy as the sense of self-esteem and competence in performing a task. Albert Bandura's (1977, 1982, 1997) theory of self-efficacy as a mediator of performance and achievement contributed to the research on motivation and learning.

John Keller's (1987) ARCS Model of Motivation Design's purpose was to stimulate and sustain a student's motivation for learning. The ARCS Model consists of four steps for enduring motivation in the learning process, which are: attention, relevance, confidence, and satisfaction (ARCS) (Keller, 1983). Specifically, confidence is unique to learner-centered beliefs. Confidence builds the learner's efficacy in the

learner's ability to have control over learning and assessment (Keller, 1984). Keller's (1987) model is categorized into four groups: person-centered, environmentally-centered, interaction-centered, and omnibus-centered. Person-centered is the direct result of theories grounded in human behavior (Keller, 1987).

Abraham Maslow's Hierarchy of Needs Theory (1943) contends that while people aim to meet basic needs, they seek to obtain progressively higher needs. Ordinarily, the needs are depicted in the form of a hierarchy identical to a pyramid (Maslow, 1943). The five levels of needs include: physiological, safety, belongingness, esteem, and self-actualization. Esteem needs include confidence, achievement, and self-esteem. Esteem mirrors efficacy, and when esteem needs are satisfied, feelings of self-confidence, strength, and the ability to achieve desired goals are exhibited (Maslow, 1943).

Research on human motivation and learning remains a driving force for research in educational psychology (Ryan & Patrick, 2001). Hidi and Harackiewicz (2000) urged educators to incorporate practices that balance both intrinsic and extrinsic motivation by focusing on students' interests, intrinsic motivation, mastery goals, extrinsic motivation, and performance goals. Mastery goal achievement is rooted in the learner's desire to improve, master a skill, and understand learning material; however, performance goal achievement is driven by competing with others for grades and recognition (Ames, 1992; Nicholls, 1984). On the whole, the APA findings (1993, 1997) and McCombs's (2003b) work with Learner-Centered Practices (LCPs) continued to validate the effectiveness of addressing human motivation and self-efficacy in learning.

Summary of the Learner-Centered Psychological Principles Theoretical Foundation

The 14 psychological principles are organized into four domains identified as (a)

metacognitive and cognitive, (b) motivational and affective, (c) developmental and social, and (d) individual differences influencing learners and learning (APA, 1993, 1997).

Accordingly, the Level I Research basis for the Learner-Centered Principles extends over a decade. The Learner-Centered Principles are in their second iteration and by definition they have the greatest positive effect on learners and learning (McCombs, 2003b). The Learner-Centered Psychological Principles are consistent with recent discoveries from psychology that link positive youth development and prevention interventions (Seligman & Csikszentmihalyi, 2000).

The resulting Learner-Centered Psychological Principle's definition of the term learner-centered and learner-centered premises provide a theoretical concept for a holistic view of how the individual principles collectively interact to influence learners and learning (McCombs, 1999). Consequently, this theoretical concept is limited in its utility for influencing educational reform due to its inability to provide practical insights that result from pure research (Ellis & Fouts, 1993).

Therefore, the Level II research section is designed to investigate and examine research conducted to test the usefulness and effectiveness of the learner-centered principles in classrooms and schools.

Level II Research

Ellis and Fouts (1993) define Level II research as program evaluation designed to test the impact of programs or instructional methods in educational settings. Accordingly, Ellis and Fouts (1993) identified two criterions that Level II research must meet: (a) the study is conducted in the same or similar setting, and (b) the study does not attempt to

develop a theory, instead, it attempts to make instructional or curricular applications of a given theory. Furthermore, Ellis and Fouts (1993) determined the outcome of Level II research as providing practical implications that cannot be derived directly from pure research.

For these reasons, this review of the Level II research section is organized into four components: (a) Learner-Centered Battery, (b) Assessment of Learner-Centered Practices Surveys, (c) Learner-Centered Principles and Student Achievement, and (d) Summary of Level II Research.

Learner-Centered Battery

The Learner-Centered Battery (LCB) is a direct result of work on the Learner-Centered Psychological Principles (APA, 1993). Researchers at McREL determined a need to construct an instrument that would support educators in addressing three purposes derived from the learner-centered principles (McCombs & Lauer, 1997).

Chiefly, the Learner-Centered Battery's utility is to provide teachers with a tool to: (a) analyze their basic beliefs and assumptions about learners, learning, and teaching with the current knowledge base; (b) respond to student perceptions of their classroom practices in domains critical to motivation, learning, and achievement; and (c) utilize self-assessment and reflection skills to determine areas of improvement for professional development in order to effectively meet the needs of all students (McCombs & Lauer, 1997).

A two-phase validation method was utilized. Initially, the reliability and content validity of teacher and student surveys were completed. Following the completion of the reliability and content validity surveys, the construct and predictive validity of teacher

and student variables were assessed (McCombs & Lauer, 1997). Evaluating student motivation and achievement during each phase was critical for initial validation (McCombs & Lauer, 1997).

Phase 1 validation efforts reported moderate to high internal consistencies (alpha coefficients from .67 to .96) that were consistent with the Learner-Centered Psychologically Principles (APA, 1993). Above all, Phase 1 empirical findings confirmed the theoretical relationships between teacher beliefs and practices; therefore, future use of self-assessment tools for enhancing teachers' reflections is promising (McCombs & Lauer, 1997).

Phase 2 validation established statistical validity of the Learner-Centered Battery by examining its association with existing data on teachers' attitudes and students' motivation, and its predictive validity. Therefore, teacher' perceptions of their practice was positively associated with their attitudes about self-efficacy, their influence on students during adolescence, reflective self-awareness, supporting their students' autonomy, and learner-centered beliefs. Likewise, their perceptions were negatively associated with their non-learner-centered beliefs about learners (McCombs & Lauer, 1997).

McCombs and Lauer (1997) declare that the Learner-Centered Battery offers an assuring set of tools for self-reflection; with focus on the following implications: (a) teachers can gain increasing individual responsibility for specifying their own professional development plan, (b) the difference between pre- and in-service teacher education has the potential to become increasingly obscured as individual teacher's needs are met in continuing education programs, and c) the "everyone learns the same" thinking

about effective teachers needs to be adjusted to reflect the variety of teacher characteristics that can accommodate both student and content differences in schools (McCombs & Lauer, 1997).

After surveying more than 660 teachers and 4,800 students, the Learner-Centered Battery was validated. The LCB final format represents a short set of 35-item teacher and student self-assessment surveys. The variables measured by the survey are teacher beliefs and assumptions, and teacher assessment of classroom practices. The three items measured in Teacher Beliefs are (a) learner-centered beliefs about learner, learning, and teaching; (b) non-learner-centered beliefs about learners; and (c) non-learned centered beliefs about learning and teaching (McCombs, 1994).

Assessment of Learner-Centered Practices Surveys

The Assessment of Learner-Centered Practices (ALCP) surveys were constructed to involve teachers in the reflection process (McCombs, 2003a). With support from more than 5,000 K-20 teachers and their more than 25, 000 students, the ALCP surveys have been validated (McCombs, 1999).

The guided reflection process assists teachers with reflecting on (a) their individual beliefs and practices, (b) their student perceptions of the teachers' classroom practices, and (c) the outcome of teacher and student learner-centered variables on student motivation and achievement (McCombs, 1999, 2003a). Teachers who make decisions about their practice based on the understandings of the Learning-Centered Principles are more likely to (a) involve learners in decisions about how and what they learn and how that learning is assessed; (b) value each learner's individual perspectives; (c) respect and respond to individual differences in learners' previous experiences, likes,

and skill-sets; and (d) include learners as partners, instead of passive recipients in the teaching and learning process (McCombs & Lauer, 1997; McCombs & Whisler, 1997).

The ALCP surveys are a set of self-assessment tools for teachers, students, and administrators. Chiefly, the ALCP surveys supports teacher self-assessment and reflection. Teachers are able to examine their beliefs and discrepancies between teacher and students perceptions on practices that can enhance student motivation and achievement is (McCombs & Lauer, 1997; McCombs & Whisler, 1997). Specific beliefs or teaching practices (not teachers) are identified either as learner-centered or non-learner-centered, (McCombs & Lauer, 1997, 1999; McCombs, 2003a). This determination is aligned with the belief that learner-centered beliefs are challenging because beliefs cannot be grouped into a single program.

Learner-Centered Principles and Student Achievement

McCombs (2003a) confirmed that teachers who are more learner-centered are more successful in engaging all students in an effective learning process (McCombs, 2003a). The implementation of the learner-centered model highlighted relationships between teachers' beliefs and perceptions of their classroom practices which has led to the identification of predictive positive outcomes for students from kindergarten through college (Weinberger & McCombs, 2001). Likewise, Wenglinsky (2000) found those math teachers who received professional development to improve their efficacy with struggling learners found that these particular students' math skills improved significantly. Judith Meece (2003) applied the learner-centered principles to 2,200 middle school students and her findings reported more positive forms of motivation and greater academic engagement among students when they perceived their teachers were using

learner-centered practices.

Summary of Level II Research

The purpose of the Learner-Centered Battery (LCB) is to address the need for teachers to examine the consistency of their basic beliefs and assumptions about learners, learning, and teaching; attend to student perceptions of their classroom practices, and self-reflect in order to meet the needs of all students (McCombs & Lauer, 1997). Chiefly, the Assessment of Learner-Centered Practices Surveys (ALCPs) applies the learner-centered principles via a set of self-assessment tools for teachers, students, and administrators that facilitate teacher self-assessment and reflection (McCombs & Lauer, 1997; McCombs & Whisler, 1997). Several studies (Meece, 2003; Weinberger & McCombs, 2001; Wenglinsky, 2000) have linked positive outcomes in student achievement to learner-centered principles. The Level III Research section provides clarification on the inability to evaluate learner-centered principles as a program.

Level III Research

Ellis and Fouts (1993) define Level III research as evaluative research designed to establish the efficacy of programs at the school or district level. For the most part, "learner-centered beliefs and practices" is not a formal program or even a unified reform effort. Therefore, Level III research consisting of studies that examine the overall effects on teachers and students is problematic and does not require further elaboration for the purpose of this research.

Teacher Effectiveness

Ruddell (1999) contends that students who were proficient in academics experienced two times as many effective teachers than challenged learners. Effective

teachers who were cited for including individual learner needs, motivation, and aptitudes in their classroom practice (Ruddell, 1999). The notion that there is a link between teacher efficacy and students' skills is a persistent theme in education research (Wenglinsky, 2000). Weinberger and McCombs (2001) reports academic performance as well as non-academic outcomes improved in learning environments where teachers displayed a higher amount of learner-centered practices over non-learner-centered practices (Weinberger & McCombs, 2001).

Teacher attitudes impact student achievement. Several researchers (Foster & Peele, 1999; Nieto, 2000) believe that effective teachers have high and clear expectations, and believe all students can learn (Foster & Peele, 1999; Nieto, 2000). Accordingly, the effective schools research reports that instruction, curriculum, and assessment designed to meet the various needs of students in a safe and orderly climate of high expectation of learning produced effective student motivation and student achievement (Edmonds, 1979).

Teacher expectations are more important for students who make up our disenfranchised populations and sub-groups (Paul, 2005; Silver, Smith, & Nelson, 1995). Numerous research studies have linked teacher expectations with math-related outcomes (Turner et al., 2003; Tyler & Boelter, 2008).

Despite current reform efforts, which focus on the principal's role in instructional leadership, the teacher's role is especially important in instructional reform because of direct impact with instruction at the classroom level (Heller & Firestone, 1995; Firestone, 1996). Teacher effectiveness has gained much attention with regards to student achievement and performance. As a result, the Interstate New Teacher Assessment and

Support Consortium (InTASC) developed a new vision of teaching for improving student achievement, which has resulted in the introduction of ten new teaching standards. Specifically, Standard 9: Professional Learning and Ethical Practice addresses the teachers' ability to reflect and evaluate how their choices impact learners (Council of Chief State School Officers [CCSSO], 2011).

Teacher behaviors, beliefs, and practices impact learning (McCombs, 2003a). How teachers work with students is greatly influenced by policy and by what they believe about student learning and behavior (McREL, 1995). In order to design and implement effective systemic reform, the basic structural domains of the educational systems and the process of systemic change itself must be thoroughly examined (Marzano & Kendall, 1996).

A Nation at Risk, reported in 1983, is similar to NCLB and highlights America's economic threat as a result of deficiencies in the education system (National Commission on Excellence in Education, 1983). School reform has been a topic of public education for the past 100 years. Education reform comes in cycles, usually designed like recipes for success. Rather than focus on the classroom, many reform efforts focus on curriculum and organization structures (Tyack & Cuban, 1995). Accordingly, one of North Carolina Department of Public Instruction's reform effort that focuses on teacher effectiveness includes the new teacher evaluation instrument (Public Schools, 2011).

With attention to teacher quality, one of the strategies employed to improve both student and teacher learning is professional learning communities. Professional learning communities have been cited as a key success factor for school improvement (Eaker et al., 2002).

A professional learning community (PLC) is best defined as a learning organization where people continually build their capacity to create desired outcomes, new ways of thinking are nurtured, and collective aspirations are set free. With attention to the word community, professional learning communities emphasize relationships, shared ideals, and a strong culture (DuFour & Eaker, 1998; Senge, 1990).

Learner-centered practices communicate the importance of continuous improvement, human needs, and relationship for optimal learning to occur. Several reform efforts have ignored learners and their needs (McCombs, 2003b). As a result of the increased need to focus on learner-centeredness, the InTASC revised model's core standards (10) set forth new and higher expectations for teachers. In brief, the revised standards are designed for teachers to be accountable for the learning of all their students (CCSSO, 2011).

Specifically, Standards 3, 6, 7, 8, 9, and 10 (CCSSO, 2011), directly relate to teacher beliefs, expectations, motivation, and learning. In short, the standards (CCSSO, 2011) directly related are:

> Standard #3: Learning Environments. The teacher works with others to create environments that support individual and collaborative learning, and that encourage positive social interaction, active engagement in learning, and self-motivation. (p. 12)
>
> Standard #6: Assessment. The teacher understands and uses multiple methods of assessment to engage learners in their own growth, to monitor learner progress, and to guide the teacher's and learner's decision making. (p. 18)
>
> Standard #7: Planning for Instruction. The teacher plans instruction that supports

> every student in meeting rigorous learning goals by drawing upon knowledge of content areas, curriculum, cross-disciplinary skills, and pedagogy, as well as knowledge of learners and the community context. (p. 16)
>
> Standard #8: Instructional Strategies. The teacher understands and uses a variety of instructional strategies to encourage learners to develop deep understanding of content areas and their connections, and to build skills to apply knowledge in meaningful ways. (p. 17)
>
> Standard #9: Professional Learning and Ethical Practice. The teacher engages in ongoing professional learning and uses evidence to continually evaluate his/her practice, particularly the effects of his/her choices and actions on others (learners, families, other professionals, and the community), and adapts practice to meet the needs of each learner. (p. 18)
>
> Standard #10: Leadership and Collaboration. The teacher seeks appropriate leadership roles and opportunities to take responsibility for student learning, to collaborate with learners, families, colleagues, other school professionals, and community members to ensure learner growth, and to advance the profession. (p. 19)

The model core standards articulate learner-centered beliefs and teacher efficacy as evidenced by their focus on the learner, teacher skill-set, motivation, and teacher reflection (CCSSO, 2011). North Carolina's new Teacher Evaluation Instrument, designed by McREL, mirrors the revised InTASC standards. Specifically, the new instrument addresses teachers being reflective practitioners via Standard 5: Teachers Reflect on their Practice (Public Schools, 2011).

Summary of Literature Review

The section on Level I research included the history of the Learner-Centered Psychological Principles, validation and construction of the learner-centered psychological principles, definition of learner-centered and closing statements on the theoretical foundation of the learner-centered principles (APA, 1993, 1997; McCombs, 1999; McCombs & Lauer, 1997).

The Level II research section provided an analyses of the learner-centered battery, assessment of learner-centered practices, learner-centered psychological principles (APA, 1993, 1997; McCombs, 1999; McCombs & Lauer, 1997; Weinberger & McCombs, 2001), and student achievement (McCombs & Lauer, 1997, McCombs & Whisler, 1997; Meece, 2003; Weinberger & McCombs, 2001).

Consequently, the review of Level III research does not exist due. The absence of Level III research is in attributed to the nature of the learner-centered psychological principles, which do not exist in isolation. Accordingly, Level I and Level II research provided a brief overview of the learner-centered principles structured utilizing Ellis and Fouts's (1993) description of Level III research. Most important to this study is the fact that questions about teacher learner-centered beliefs and practices have yet to be correlated with student achievement as measured by the North Carolina EOG Test.

Purpose Statement

The purpose of this study was to examine the relationship of learner-centered beliefs of eighth-grade math teachers and students enrolled in their respective districts performance on the North Carolina End-of-Grade (EOG) Mathematics Test. Quantitative data were collected via the Teacher Beliefs Survey, North Carolina School Report

Cards/Profiles, and North Carolina eighth-grade EOG math scores. Data were collected from teachers representative of the schools that reside in five districts (n = 5) that are a part of the Sandhills Regional Education Consortium (SREC).

The schools selected were located in the central part of North Carolina. North Carolina is home to 100 county districts, 15 city districts, 99 charter schools, and 71 early colleges. A combined 2,524 schools served 1,475,668 students (Public Schools, 2011). Five (n = 5) of the 115 districts were part of the SREC, and five districts participated (SREC, 2011).

Although similar studies have been conducted in other states, research using the Teacher Beliefs Survey to examine teacher efficacy and student achievement based on mathematics has not been formatively researched in North Carolina. The information gained from this study extends beyond the rural district in which the author works and provides a framework for future study in all of North Carolina Public Schools and beyond.

Hypotheses

As a result of the literature review the following hypotheses emerged:

Hypothesis 1. Districts that have a higher percentage of students meeting (Level III) or exceeding (Level IV) the state standard on the eighth-grade EOG Mathematics Test have learner-centered teachers teaching mathematics.

Hypothesis 2. Districts that have a lower percentage of students meeting (Level III) or exceeding (Level IV) the state standard on the eighth-grade EOG Mathematics Test have non-learner-centered teachers teaching mathematics.

Hypothesis 3. There is a higher correlation between student performance on the

eighth-grade EOG Mathematics Test with teachers with learner-centered beliefs.

Hypothesis 4. There is a higher inverse correlation between student performance on the eighth-grade EOG Mathematics Test with teachers with non-learner-centered beliefs.

Research Questions

This study was directed by research questions categorized by two separate purposes. The first category consisted of questions designed to examine the relationship of learner-centered beliefs of eighth-grade math teachers and student achievement. The second category consisted of questions designed to determine if there are differences between eighth-grade math teachers on their learner-centered beliefs. The research questions are:

Research Question 1. What is the level of learner-centered beliefs by eighth-grade math teachers?

Research Question 2. Is there a difference in the level of learner-centered beliefs and non-learner-centered beliefs about the learner, teaching and learning of teachers, and student achievement on the eighth-grade 2011 EOG Mathematics Test?

Research Question 3. Is there a difference in the level of learner-centered beliefs about the learner between teachers in districts with a higher percentage of students who met or exceeded state standards on the eighth-grade EOG Mathematics Test?

Research Question 4. Is there a difference in the level of non-learner-centered beliefs about the learner between teachers in districts with a higher percentage of students who met or exceeded state standards on the eighth-grade EOG Mathematics Test?

Research Question 5. Is there as difference in the level of non-learner-centered

beliefs about teaching and learning between teachers in districts with a higher percentage of students who met or exceeded state standards on the eighth-grade EOG Mathematics Test than those teachers with a lower percentage of students who met or exceeded state standards on the eighth-grade EOG Mathematics Test?

Research Question 6. What is the relationship of learner-centered beliefs of eighth-grade mathematics teachers and student achievement between districts within the SREC on the eighth-grade EOG Mathematics Test in 2011?

Chapter 3: Methodology

General Design

This study was designed to explore six questions via a non-experimental research design utilizing descriptive as well as causal comparative design components. The purpose of this study was to determine the learner-centered beliefs of selected eighth-grade mathematics teachers in the SREC in the state of North Carolina. Therefore, this study examined and compared the learner-centered beliefs of teachers to determine differences, if any, as well as possible causal relationships with the performance of students on the eighth-grade EOG mathematics test.

Participants

The 16 participants (n = 16) in this study consisted of middle school mathematics teachers from middle schools located in five (n = 5) of the 12 Local Educational Agencies (LEAs) in the Sandhills region of North Carolina. The participants were selected based on their teaching of eighth-grade mathematics during the 2010-2011 school year. The districts represented in this study are Anson County, Cumberland County, Harnett County, Montgomery County, and Richmond County. The participants consisted of teachers from districts with 70-80% of students proficient via a Level III or Level IV. North Carolina Department of Public Instruction (2011) defines proficient as achieving Level III (met standard) or Level IV (exceeded standard) on the EOG Mathematics Test. The participating districts respective proficiency percentages on the eighth-grade EOG Mathematics Test for the 2010-2011 school year were a) Anson County 72%, b) Cumberland County 77.4%, c) Harnett County 74.8%, d) Montgomery County 75.3%, and e) Richmond County 70.7%.

Rarely are samples identical to their population of study when they only represent a small portion of the population (Fraenkel & Wallen, 2006). Ary, Jacobs, and Razavieh (2009) reported that the sampling errors of the mean (difference between a sample and its population) yielded specific known laws to include:

> The expected mean of sampling errors is zero, sampling error is an inverse function of sample size, sampling error is a direct function of the standard deviation of the population and sampling errors are distributed in a normal or near-normal manner around the expected mean of zero. (pp. 159–160)

Instrument

Teacher Beliefs Survey. The instrument used in this study contained two sections-Part I: Background and Demographic Information and Part II: Teacher Beliefs Survey.

Part I: Background and Demographic Information. In this section, participants were asked to identify (a) the total number of years teaching, (b) the number of years teaching mathematics, and (c) the number of years teaching middles school mathematics. In addition participants were asked to identify their undergraduate major and minor as well as the highest degree earned.

Part II: Teacher Beliefs Survey. The Teacher Beliefs Survey (McREL, 1994) contains 35 items. The initial validation efforts focused on establishing internal consistency reliability and factor structures (theoretically, sound sub-scales related to learner-centered beliefs and practices) for the teacher scales. The results revealed 35 items divided into three subscales: (a) Learner-Centered Beliefs about Learners, Learning, and Teaching (14 items, alpha = .87); (b) Nonlearner-Centered Beliefs about

Learners (9 items, alpha = .83); and (c) Nonlearner-Centered Beliefs about Teaching and Learning, (12 items, alpha = .82) (McCombs, 1994).

The second phase of validation focused on establishing the predictive validity and further constructs validity of the Teacher Survey (McCombs, 1994). Therefore, the Teacher Beliefs Survey has demonstrated both internal consistency and construct validity.

North Carolina EOG Mathematics Test. The measure of student achievement was the North Carolina EOG Mathematics Test. The Mathematics Test consists of 82 multiple-choice questions. The Mathematics Test was designed to measure student performance on goals, objectives, and grade-level competencies specified in the North Carolina Standard Course of Study. Specific skills in number operation, measurement, geometry, data analysis and probability, and algebra are assessed.

Student results are reported in scale scores, percentile scores, and achievement levels. Scale scores provide a consistent method for interpretations of results from test to test. Percentile scores show student performance relative to students who took the test during the first year the tests were administered. Achievement Levels (I, II, III, or IV) are used to provide an interpretation of student performance relative to pre-determined standards based on ranges of scale scores. Specifically, this study focused on the percentage of students who were proficient as determined by an achievement Level of III or IV. The test is administered within the last 3 weeks of the school year (Public Schools, 2011).

Procedures

A sample of 16 (n = 16) math teachers assigned to teach eighth-grade math in

2010-2011 was identified from 5 (n = 5) of the 12 districts in the SREC. An electronic cover letter requesting participation and explaining the purpose of the study was emailed to each eighth-grade math teacher. The researcher created a web-based survey site where participants could take the survey at their convenience.

The study was designed to explore the answers to the six research questions. The main question to be answered required a descriptive and causal comparative research design. Accordingly, this study collected data on multiple variables to ascertain the relationship between these variables (Fraenkel & Wallen, 2006). The independent variable in this study was the teacher learner-centered beliefs as measured by the Teacher Beliefs Survey. The dependent variable in this study was academic achievement as measured by the North Carolina EOG eighth-grade math test.

Data Analysis

Using the IBM Statistical Package for Social Sciences Base 20 (IBM, 2011), data from descriptive statistics utilizing mean and independent measures *t*-tests are reported in Chapter 4. Inferential statistics utilizing an Analysis of Variance and Pearson Product-Moment Correlation Coefficient were used in data analysis of the Teacher Beliefs Survey (IBM, 2011).

Descriptive Statistics

Specifically, descriptive statistics were utilized to determine the measures of central tendency and measures of variability. The Teacher Beliefs Survey results are reported via a total score measuring each of the following three factors: (a) Learner-Centered Beliefs about learners, learning, and teaching (14 items); (b) Non-learner-centered beliefs about learners; and (c) Non-learner-centered beliefs about teaching and

learning.

The total score possible for Learner-Centered Beliefs about learners, learning, and teaching (14 items) ranges from a low of 14 (14 x 1) to a high of 56 (14 x 4); the total possible score for Non-Learner-Centered Beliefs about learners (9 items) ranges from a low of 9 (9 x 1) to a high of 36 (9 x 4); and the total possible score for Non-Learner-Centered Beliefs about learning and teaching (12 items) ranges from a low of 12 (12 x 1) to a high of 48 (12 x 4). Once totaled, each factor was divided by the number of items in each factor, resulting in a mean score. Likewise, the validation sample means were: a) Factor 1, 3.22; b) Factor 2, 2.28; and c) Factor 3, 2.31 (McCombs & Whisler, 1997).

Consequently, McCombs and Whisler's (1997) research identified those teachers with $M > 3.4$ for Learner-Centered Beliefs, $M < 2.0$ for Non-Learner-Centered Beliefs about learners, and $M < 2.0$ for Non-Learner-Centered Beliefs about Teaching and Learning as teachers with learner-centered beliefs.

Conversely, research identified those with $M > 2.8$ for Learner-Centered Beliefs, $M > 2.4$ for Non-Learner-Centered Beliefs about learners, and $M > 2.4$ for Non-Learner-Centered Beliefs about Teaching and Learning as teachers with non-learner-centered beliefs (McCombs & Whisler, 1997).

In addition to the Teacher Beliefs, the survey included demographic questions such as years of math-teaching experience, area of academic preparation, and level of education attained.

Inferential Statistics

In addition to studying relationships, several research questions were designed to explore differences. To that end, an analysis of variance (ANOVA) statistical procedure

was utilized to determine where and on which specific variables differences existed between means on each factor of the Teacher Beliefs Survey. As Kaufhold (2007) pointed out, an "ANOVA is used to compare the differences in more than two means and a further breakdown could be made" (p. 81). Particularly, the ANOVA tested the following: (a) teacher results in the same district, (b) teacher results from within each category, and (c) teacher results from both categories to determine whether each factor and the interactions between the factors were statistically significant.

The results from the eighth-grade 2011 EOG Mathematics Test served as a dependent variable, and an ANOVA to obtain an *F*-stat yielded the following between each school: (a) teachers' degree of learner-centeredness and the individual test score for each school, (b) teachers' degree of non-learner-centeredness about learners and the individual test score for each school, and (c) teachers' degree of non-learner-centeredness about learning and teaching the individual test score for each school. An appropriate post hoc analysis was not conducted because the ANOVA did not determine a significant difference.

A Pearson Product-Moment correlation was performed to determine the relationship, if any, between teacher beliefs and performance on the eighth-grade 2011 EOG Mathematics Test. Chiefly, the teachers' degrees of learner-centeredness, non-learner-centeredness about learners, and non-learner-centeredness about learning and teaching were examined to determine the direction and magnitude of a relationship, if any, between student achievement and teacher beliefs.

Summary of Methodology

In summary, the methodology implemented in this research study were designed

to answer six research questions. Descriptive statistics was used to determine the mean and variability, and inferential statistics including the Independent Sample *t*-test, Analysis of Variance, and Pearson Product Moment Correlation Coefficient were used to determine differences and possible causal relationships between the learner-centered beliefs of selected eighth-grade mathematics teachers in the state of North Carolina with the performance of students on the eighth-grade EOG Mathematics Test.

Chapter 4: Results

Four sections frame the organization of the results chapter. Section one includes demographic characteristics of the districts and the eighth-grade mathematics teachers who participated in this research study. Section two includes the results of four hypotheses. Section three is separated into six sub-sections. The sub-section reports the answers to the six research questions, statistical analysis, and the actual results. The last section includes a summary of results.

Demographic Characteristics

Total years of teaching. One teacher (n = 1) or 6% were in their second through fourth year of teaching (see Table 1). Five (n = 5) or 31% ranged from 5 to 9 years of total teaching experience. Three (n = 3) or 19% had 10 to 15 years of total teaching experience. Four (n = 4) or 25% ranged from 16 to 23 years of total teaching experience. Finally, three (n = 3) or 19% had 24 years or more of total teaching experience. These results are presented in Table 1.

Table 1

Total Years Teaching

District	1-4 years	5-9 years	10-15 years	16-23 years	24 years
Anson County Schools					2
Cumberland County Schools		4	1	2	
Harnett County Schools		1	1	1	1
Montgomery County Schools	1			1	
Richmond County Schools			1		
Total	1 (6%)	5 (31%)	3 (19%)	4 (25%)	3 (19%)

Total years of teaching mathematics. As seen in Table 2, one teacher (*n* = 1) or 6% was in the second through fourth year of teaching mathematics (see Table 2). Four (*n* = 4) or 25% ranged from 5 to 9 years of teaching mathematics. Five (*n* = 5) or 31% had 10 to 15 years of teaching mathematics. Three (*n* = 3) or 19% ranged from 16 to 23 years of teaching mathematics. Finally, three (*n* = 3) or 19% had 24 years or more of teaching mathematics.

Table 2

Total Years Teaching Math

District	1-4 years	5-9 years	10-15 years	16-23 years	24 years
Anson County Schools					2
Cumberland County Schools		3	2	1	1
Harnett County Schools		1	2	1	
Montgomery County Schools	1			1	
Richmond County Schools			1		
Total	1 (6%)	4 (25%)	5 (31%)	3 (19%)	3 (19%)

Total years of teaching middle school mathematics. The following results are displayed in Table 3. Two teachers (*n* = 2) or 13% were in their second through fourth year of teaching mathematics at the middle school level. Four (*n* = 4) or 25% ranged from 5 to 9 years of teaching middle school mathematics. Three (*n* = 3) or 19% had 10 to 15 years of teaching middle school mathematics. Three (*n* = 3) or 19% ranged from 16 to 23 years of teaching middle school mathematics. Finally, four (*n* = 4) or 25% had 24 years or more of teaching middle school mathematics (see Table 3).

Table 3

Total Years Teaching Middle School Math

District	1-4 years	5-9 years	10-15 years	16-23 years	24 years
Anson County Schools					2
Cumberland County Schools	1	3	1	1	1
Harnett County Schools		1	1	1	1
Montgomery County Schools	1			1	
Richmond County Schools			1		
Total	2 (13%)	4 (25%)	3 (19%)	3 (19%)	4 (25%)

Major area of teaching preparation. Ten teachers (*n* = 10) or 63% reported that mathematics was their major area of teacher preparation. One (*n* = 1) or 6% reported science as the major area of teacher preparation. One (*n* = 1) or 6% reported language arts as the major area of teacher preparation. One (*n* = 1) or 6% reported Social Studies as the major area of teacher preparation. Lastly, three (*n* = 3) or 19% reported "other" as their major area of teacher preparation (see Table 4).

Table 4

Major Area of Teaching

District	Mathematics	Science	Language Arts	Social Studies	Other
Anson County Schools	2				
Cumberland County Schools	3	1		1	2
Harnett County Schools	3		1		
Montgomery County Schools	1				1
Richmond County Schools	1				
Total	10 (63%)	1 (6%)	1 (6%)	1 (6%)	3 (19%)

Minor area of teaching preparation. As seen in Table 5, six teachers (*n* = 6) or 38% indicated that mathematics was their minor area of teacher preparation. Three (*n* = 3) or 19% identified science as their minor area of teacher preparation. One (*n* = 1) or 6% identified language arts as the minor area of teacher preparation. Two (*n* = 2) or 13% identified social studies as their minor area of teacher preparation. Finally, four (*n* = 4) or 25% identified "other" as their minor area of teacher preparation.

Table 5

Minor Area of Teaching

District	Mathematics	Science	Language Arts	Social Studies	Other
Anson County Schools	1				1
Cumberland County Schools	3	1		1	2
Harnett County Schools		2	1	1	
Montgomery County Schools	1				1
Richmond County Schools	1				
Total	6 (38%)	3 (19%)	1 (6%)	2 (13%)	4 (25%)

Highest degree earned. Ten teachers (*n* = 10) or 63% indicated their highest degree was either a Bachelor of Arts or Bachelor of Science. Six (*n* = 6) or 38% indicated their highest degree earned was either a Masters of Art or a Masters of Science. There were no participants who indicated they had earned a doctorate (see Table 6).

Table 6

Highest Degree Earned

District	BA/BS	MA/MS	Ph.D./Ed.D.
Anson County Schools	1	1	
Cumberland County Schools	6	1	
Harnett County Schools		4	
Montgomery County Schools	2		
Richmond County Schools	1		
Total	10 (63%)	6 (38%)	

Data Report

From the review of literature, four hypotheses were identified and investigated through six research questions. The four hypotheses were:

Hypothesis 1. Districts that have a higher percentage of students meeting (Level III) or exceeding (Level IV) the state standard on the eighth grade EOG Mathematics Test have learner-centered teachers teaching mathematics.

Hypothesis 2. Districts that have a lower percentage of students meeting (Level III) or exceeding (Level IV) the state standard on the eighth-grade EOG Mathematics Test have non-learner-centered teachers teaching mathematics.

Hypothesis 3. There is a higher correlation between student performance on the Eighth-grade EOG Mathematics Test with teachers with learner-centered beliefs.

Hypothesis 4. There is a higher inverse correlation between student performance on the eighth-grade EOG Mathematics Test with teachers with non-learner-centered beliefs.

To test the null hypothesis, six research questions were identified. The results from each research question are described in the following sections.

Research Question 1. What is the level of learner-centered beliefs by eighth-grade math teachers? McCombs and Whisler (1997) defined those teachers with $M > 3.4$ for Learner-Centered Beliefs, $M < 2.0$ for Non-learner-centered Beliefs about Learners, and $M < 2.0$ for Non-learner-centered Beliefs about Teaching and Learning as teachers with learner-centered beliefs. Teachers with $M < 2.8$ for Learner-Centered Beliefs, $M > 2.4$ for Non-learner-centered Beliefs about Learners, and $M > 2.4$ for Non-learner-centered Beliefs about Teaching and Learning were identified as teachers with non-learner-centered beliefs. Utilizing descriptive statistics and calculating the mean, the results of Research Question 1 are shown in Table 7.

Table 7

Learner-Centered Beliefs Means

School	LCB	NLCB (Learners)	NLCB (Learning and Teaching)
Richmond County Schools-A	3.4	2.4	2.3
Cumberland County Schools-A	3.6	1.9	3.1
Cumberland County Schools-B	2.2	2.1	2.3
Cumberland County Schools-C	4.0	1.3	2.9
Cumberland County Schools-D	2.3	2.1	3.2
Cumberland County Schools-E	3.9	2.4	3.5
Cumberland County Schools-F	3.9	1.9	2.0
Cumberland County Schools-G	2.9	2.4	2.8
Anson County Schools-A	3.5	2.2	2.8
Anson County Schools-B	3.2	1.8	2.7
Harnett County Schools-A	3.5	2.9	2.8
Harnett County Schools-B	3.5	1.6	2.3
Harnett County Schools-C	2.8	3.7	3.2
Harnett County Schools-D	3.2	1.7	2.5
Montgomery County Schools-A	2.8	2.9	3.1
Montgomery County Schools-B	4	4	4

McCombs and Whisler (1997) reported that standard deviations for each factor were .40, .56, and .49. However, the standard deviations for this study based on all three factors were .55, .74, and .51 respectively (see Table 8). Thirteen teachers (n = 13) did not meet McCombs and Whisler (1997) statistical definition of a learner-centered teacher or non-learner-centered teacher. One teacher (n = 1) met the criteria for learner-centered beliefs (see Table 9).

Table 8

Differences Among Teachers on Learner-Centered and Non-Learner-Centered Beliefs

	N	*M*	*SD*
LCB	16	3.27	0.55
NLCBL	16	2.33	0.74
NLCBTL	16	2.84	0.51

Table 9

Learner-Centered Teachers

School	*M* > 3.4	*M* < 2.0	*M* < 2.0
Cumberland County Schools—F	3.9	1.9	2.0

Three teachers met the McCombs and Whisler (1997) statistical definition of a learner-centered teacher or non-learner-centered teacher. Nine (n = 9) teachers met or exceeded the validation mean of $M > 3.4$ for the learner-centered beliefs about the learner, teaching, and learning (see Table 10). However, two (n = 2) teachers, met the criteria for non-learner-centered beliefs (see Table 11).

Table 10

Teachers Above the Validation Mean for Learner-Centered Beliefs

School	LCB $M > 3.4$
Richmond County Schools – A	3.4
Cumberland County Schools – A	3.6
Cumberland County Schools – C	4
Cumberland County Schools – E	3.9
Cumberland County Schools – F	3.9
Anson County Schools – A	3.5
Harnett County Schools – A	3.5
Harnett County Schools – B	3.5
Montgomery County Schools – B	4

Table 11

Non-Learner-Centered Teachers

School	$M < 2.8$	$M > 2.4$	$M > 2.4$
Harnett County Schools – C	2.8	3.7	3.2
Montgomery County Schools – A	2.8	2.9	3.1

As displayed in Tables 12 and 13, only two teachers met the McCombs and Whisler (1997) statistical definition of a non-learner-centered teacher. Two ($n = 2$) teachers were below the validation mean of $M < 2.8$ for the learner-centered beliefs about the learner, teaching, and learning. Fourteen teachers ($n = 14$) were above the validation mean associated with non-learner-centered beliefs. In concert, seven ($n = 7$) teachers were above the validation mean of $M > 2.4$ for the non-learner-centered beliefs about the learner and fifteen teachers ($n = 15$) were above the validation mean of $M > 2.4$ for non-learner-centered beliefs about teaching and learning.

Table 12

Teachers Above the Validation Mean for Non-Learner-Centered Beliefs: Learner

School	NLCB (Learners)
Richmond County Schools – A	2.4
Cumberland County Schools – E	2.4
Cumberland County Schools – G	2.4
Harnett County Schools – A	2.9
Harnett County Schools – C	3.7
Montgomery County Schools – A	2.9
Montgomery County Schools – B	4

Table 13

Teachers Above the Validation Mean for Non-Learner-Centered Beliefs: Teaching and Learning

School	NLCB (Learning and Teaching)
Richmond County Schools – A	2.3
Cumberland County Schools – A	3.1
Cumberland County Schools – B	2.3
Cumberland County Schools – C	2.9
Cumberland County Schools – D	3.2
Cumberland County Schools – E	3.5
Cumberland County Schools – G	2.8
Anson County Schools – A	2.8
Anson County Schools – B	2.7
Harnett County Schools – A	2.8
Harnett County Schools – B	2.3
Harnett County Schools – C	3.2
Harnett County Schools – D	2.5
Montgomery County Schools – A	3.1
Montgomery County Schools – B	4

Research Question 2. Is there a difference in the level of learner-centered beliefs and non-learner-centered beliefs about the learner, teaching and learning of teachers and student performance on the eighth grade 2011 EOG Mathematics Test?

An analysis of variance (ANOVA) was conducted to assess whether the North Carolina EOG mathematics scale score means were statistically significantly different among the learner-centered belief means, non-learner-centered beliefs about learners means, and non-learner-centered beliefs about teaching and learning means. The test results, which can be seen in Table 14, failed to identify a statistically significant difference. Because the overall *F* test was not significant, no follow-up tests were conducted.

Table 14

Analysis of Variance for Total Score

Source	*Df*	*F*	*Sig.*
LCB	14	.005	.945
NLCBL	14	.005	.947
NLCBTL	14	1.970	.624

Research Question 3. Is there a difference in the level of learner-centered beliefs about the learner between teachers in districts with a higher percentage of students who met or exceeded state standards on the eighth-grade EOG Mathematics Test?

An overall score from the Teacher Beliefs Survey was calculated along with a total mean along with each district's eighth grade EOG Mathematics Tests. An independent samples *t*-test was performed to evaluate if a statistical difference existed between higher-performing districts teacher scores on the level of learner-centered beliefs (see Tables 15 and 16).

Table 15

Difference Between Teachers in High-Performing Districts Learner-Centered Beliefs

		N	*M*	*SD*	Std. Error Mean
LCB	≥ 75.3	9	3.27	.75	.215
	< 75.3	7	3.29	.28	.104

Table 16

Independent Samples Test Between High- and Low-Performing Districts

	Levene's Test for Equality of Variances				
	F	*Sig.*	*t*	*df*	Sig. (2-tailed)
Equal variances assumed	18.036	.001	-.071	14	.945
Equal variances not assumed			-.078	10.6	.939

An Independent sample *t*-test was conducted to evaluate if a statistical difference existed between high-performing districts teacher scores on the level of non-learner-centered beliefs about the learner (see Tables 17 and 18). The test result, t (14) = .068, p = .947, supported the hypothesis that teachers in higher-performing districts (M = 2.34, SD = .76) were less non-learner-centered about the learners than teachers in lower-performing districts (M = 2.32, SD = .76).

Table 17

Difference Between Teachers in Higher-Performing Districts: Non-Learner-Centered Beliefs About the Learner

		N	***M***	***SD***	**Std. Error Mean**
NLCBL	≥ 75.3	9	2.34	.76	.253
	< 75.3	7	2.32	.76	.287

Table 18

Independent Samples Test Between Teachers in Higher-Performing Districts: Non-Learner-Centered Beliefs About the Learner

	Levene's Test for Equality of Variances				
	F	Sig.	*T*	df	Sig. (2-tailed)
Equal variances assumed	.048	.829	.068	14	.947
Equal variances not assumed			.068	13	.947

Research Question 5. Is there a difference in the level of non-learner-centered beliefs about teaching and learning between teachers in districts with a higher percentage of students who met or exceeded state standards on the eighth-grade EOG Mathematics Test than teachers in districts with a lower percentage of students who met or exceeded state standards on the eighth-grade EOG Mathematics Test?

An independent samples *t*-test was performed to evaluate if a statistical difference existed between higher-performing districts teacher and lower-performing districts teacher scores on the level of non-learner-centered beliefs about teaching and learning; results are displayed in Tables 19 and 20.

Table 19

Difference Between Teachers in Higher- and Lower-performing Districts: Non-Learner-Centered About Teaching and Learning

		N	*M*	*SD*	Std. Error Mean
NLCBTL	≥ 75.3	9	3.00	.59	.196
	< 75.3	7	2.64	.32	.118

Table 20

Independent Samples Test: Difference Between Teachers in High- and Low-Performing Districts: Non-Learner-Centered about Teaching and Learning

	Levene's Test for Equality of Variances				
	F	*Sig.*	*t*	*df*	Sig. (2-tailed)
Equal variances assumed	1.219	.288	1.403	14	.182
Equal variances not assumed			1.51	12.7	.155

The test result, t (14) = 1.403, p = .182, was opposite to the hypothesis that teachers in higher-performing districts (M = 3.00, SD = .59) were less non-learner-centered about the learners than teachers in lower-performing districts (M = 2.64, SD = .32).

Research Question 6. What is the relationship of learner-centered beliefs of eighth-grade mathematics teachers and student achievement between districts within the Sandhills Regional Education Consortium on the eighth-grade EOG Mathematics Test in 2011?

Correlation coefficients were calculated among the three levels of learner-centered beliefs. Results of the correlational analysis are presented in Table 21. The results in Table 21 display that one correlation was statistically significant. Specifically, the correlation between non-learner-centered beliefs and non-learner-centered beliefs about teaching and learning was significant (r (14) = .624, p < .01). The correlation between learner-centered beliefs about the learner and non-learner-centered beliefs about the learner and the correlation of learner-centered beliefs and non-learner-centered beliefs about teaching and learning was lower and not significant.

Table 21

Correlations Among the Levels of Learner-Centeredness

	NLCB (Learners)	NLCB (Teaching and Learning)
LCB	-.065	.160
NLCB		.624**

Note. **p < .01

A second set of correlation coefficients was calculated among the three levels of learner-centered beliefs with the Total Score (See Table 22). The correlation of the Learner-Centered Beliefs with the Total Score resulted in r (14) = .520, p < .05. The correlation of the non-learner-centered Beliefs about the Learner with the Total Score resulted in r (14) = .564, p < .05. The correlation of the non-learner-centered Beliefs about Teaching and Learning with the Total Score resulted in r (14) = .771, p < .01. Thus, statistical significant correlations were achieved and were equal to or greater than .35.

Table 22

Correlations Among the Levels of Learner-Centeredness with Total Score

	LCB	NLCB (Learners)	NLCB (Learning and Teaching)
Total Score	.52*	.57*	.77**

Note. *p < .05, **p < .01

A third set of correlation coefficients was calculated among the three levels of Learner-Centered Beliefs with the mean scale scores (See Table 23). The correlation of the Learner-centered beliefs with the mean scale score resulted in r (14) = -.071, p < .425. The correlation of the non-learner-centered Beliefs about the Learner with the mean scale score resulted in r (14) = -.121, p < .655. The correlation of the non-learner-centered

Beliefs about Teaching and Learning with the mean scale score resulted in r (14) = .188, p < .486. Thus, there were no statistically significant correlations from this analysis.

Table 23

Correlations Among the Levels of Learner-Centeredness with Mean Scale Score

	LCB	NLCB (Learners)	NLCB (Learning and Teaching)
Mean Scale Score	-.071	-.121	.188

Summary

This chapter reported demographic information on participants, descriptive statistics, inferential statistics, and answers to six research questions that guided this study. Demographic information describing the participants in the study was presented. Descriptive statistics were utilized to statistically define the participants and data collected from the Teacher Beliefs Survey. Using an Independent-Samples *t*-Tests, Analysis of Variance, and Pearson Product-Moment Correlation Coefficient, all six research questions were explored. Overall, the data analysis resulted in a failure to reject the four null hypotheses and therefore did not show statistically significant differences or statistically significant correlations between learner-centered teachers, non-learner-centered teachers and student performance of students on the eighth-grade EOG Mathematics Test in 2011. Statistical significance was identified with two of the three Pearson Product Moment Correlation Coefficient data analyses. In Chapter 5, an in-depth discussion of the results is presented based on the results reported in Chapter 4.

Chapter 5: Discussion

Chapter 5 is organized in the following sequence: (a) a review of the purpose of this dissertation, (b) a discussion of the results and demographic data presented in Chapter 4, (c) limitations of this study, and (d) a conclusion accompanied by recommendations for future study.

Review of Dissertation

This study examined the relationships of learner-centered beliefs of eighth grade math teachers and their student performance on the North Carolina Eighth Grade End-of-Grade Mathematics Test. Specifically, the researcher focused on teachers and districts located in the Sandhills Regional Education Consortium in central North Carolina.

Implications of Findings

Sixteen (n = 16) teachers who taught eighth grade mathematics during the 2010-2011 school year in a district located in the Sandhills Regional Education Consortium participated in this study. The 16 teachers represented 5 of the 12 districts that makeup the Sandhills Regional Education Consortium. The majority of the teachers had been teaching middle school mathematics for 5 or more years and majored in mathematics. With regards to advance degrees, only about one-third of the participants held a Master's degree. The demographic data did not suggest a difference in total years teaching, total years teaching mathematics, area of preparation, or highest degree earned with the level of learner-centered beliefs. Interestingly, Harnett County teachers (n = 4) all held Master's Degrees; however, Harnett County yielded one of the two results for a non-learner-centered teacher. These factors may impact student performance; however, they are beyond the scope of this study and further investigation is worthy.

As identified as a potential limitation, the sample size (n = 16) was selected based primarily on the permissions granted by secondary district superintendents within the Sandhills Regional Education Consortium. For research purposes, a sample should be as large as the researcher can obtain with a reasonable expenditure of time and resources; however, 30 participants are recommended as a general guideline for sample size (Fraenkel & Wallen, 2006). Though this study reflects the sample size obtainable by the researcher and the researcher collected data over a 3-month period, the small sample size does bring into question the external validity or generalizability of results. Therefore, the extent to which the conclusions from this study can be believed to accurately reflect the results of 5 districts (n = 5) and 16 (n = 16) middle school teachers in North Carolina is a concern. Ary et al. (2009) stated, "[We] can justify stating that a sample mean is an unbiased estimate of the population mean and is a reasonable estimate of the population mean" (p. 159). Most importantly, the design of the study looked at eighth-grade mathematics teachers from districts in the Sandhills Regional Education Consortium in an effort to assess, if present, the level of learner-centered beliefs and their statistical difference and the impact of those beliefs on student achievement. To the degree that superintendents agreed to the study, teachers of eighth-grade mathematics were asked to participate based on their teaching eighth-grade mathematics during the 2010-2011 school year. It is necessary to make mention again the small sample size of this study was due to seeking permission from superintendents and due to the maximum amount research projects districts allow per year. As such, this sample size was a limitation to the study.

This study also proved to be unique in that one achievement area was examined—

mathematics. Given that the purpose of this present study was to ascertain the level of learner-centeredness among eighth-grade mathematics teachers, it was important to focus specifically on their beliefs. According to Fraenkel and Wallen (2006), a sample size of sixteen (n = 16) does not necessarily mean the sample was too small to justify the conclusions of the research. Arguably, the most important characteristic of a sample is its representativeness, not its size. Given that several of the districts represented in this study were home to less than 3 middle schools, the participants were representative of those districts.

The demographic information did not suggest a difference in the total years of teaching, total years of teaching mathematics, total years of teaching college mathematics, areas of preparation, or highest degree earned with the level of learner-centered beliefs. It is possible that these factors were beyond the range of this research study. Nevertheless, the possible differences are worthy of further investigations.

The review of literature identified four hypotheses. Previously reported in Chapter 4, the null hypotheses for each of the four hypotheses were tested through six research questions. The information in the section below states each hypotheses followed by the applicable research question (s) and discussion

Hypothesis 1. Districts that have a higher percentage of students meeting (Level III) or exceeding (Level IV) the state standard on the eighth grade EOG Mathematics Test have learner-centered teachers teaching mathematics.

Hypothesis 2. Districts that have a lower percentage of students meeting (Level III) or exceeding (Level IV) the state standard on the eighth-grade EOG Mathematics Test have non-learner-centered teachers teaching mathematics.

Research Question 1. What is the level of learner-centered beliefs by eighth-grade math teachers? To determine the level of learner-centered beliefs of eighth-grade mathematics teachers, the means from each factor were statistically compared to the validation means. The results, as reported in Chapter 4, identified one teacher ($n = 1$) as meeting the statistical criteria for non-learner-centered beliefs. However, only three ($n = 3$) teachers met the McCombs and Whisler (1997) statistical definition of a learner-centered teacher or non-learner-centered teacher. Subsequently, upon a more careful examination, nine ($n = 9$) teachers met or exceeded the validation mean of $M > 3.4$ for the learner-centered beliefs about the learner, teaching, and learning. Conversely, two ($n = 2$) teachers met the criteria for non-learner-centered beliefs. In conclusion, only one teacher met the criteria for learner-centered.

Research Question 6. What is the relationship of learner-centered beliefs of eighth-grade mathematics teachers and student achievement between districts within the Sandhills Regional Education Consortium on the eighth-grade EOG Mathematics Test in 2011? Specifically, the correlation between non-learner-centered beliefs and non-learner-centered beliefs about teaching and learning was significant ($p < .01$); however, after correlating among the three factors, there were no statistically significant correlations ($p < .486$) between leaner-centered beliefs, non-learner-centered beliefs about the learner, and non-learner-centered beliefs about learning and teaching and their impact on student achievement.

Overall, these findings were not statistically significant; they highlight a better understanding about the participants in this study and the statistical significance of two of the three Pearson Product -Moment Correlations Coefficient data analyses. Chiefly, the

results failed to reject null Hypotheses 1 and 2. This study suggests that teachers' beliefs do not have an impact on student performance as measured by the eighth-grade EOG Mathematics Test. Although the sample size (n = 16) was small, the results suggest that teacher beliefs and practices may not be identical with regards to mathematics achievement.

Hypothesis 3. There is a higher correlation between student performance on the eighth-grade EOG Mathematics Test with teachers with learner-centered beliefs.

Hypothesis 4. There is a higher inverse correlation between student performance on the eighth-grade EOG Mathematics Test with teachers with non-learner-centered beliefs.

Research Question 2. Is there a difference in the level of learner-centered beliefs and non-learner-centered beliefs about the learner, teaching and learning of teachers and student performance on the eighth-grade 2011 EOG Mathematics Test?

An analysis of variance (ANOVA) measured whether the North Carolina EOG mathematics proficient means were statistically significantly different among the learner-centered beliefs about learners' means, and non-learner-centered beliefs about learners' means, and non-learner-centered beliefs about teaching and learning means. The test results failed to identify a statistically significant difference. Therefore, the results of this research question rejected the null hypothesis. There is no difference in teacher learner-centered beliefs and student performance on the eighth-grade 2011 EOG Mathematics Test. Results suggested that learner-centered beliefs of eighth-grade mathematics teachers may be aligned with classroom practices; therefore, further investigation including student perceptions and teacher actions are warranted to make a better judgment eighth-

grade mathematics teachers and student performance.

Research Question 3. Is there a difference in the level of learner-centered beliefs about the learner between teachers in districts with a higher percentage of students who met or exceeded state standards on the eighth-grade EOG Mathematics Test? The Teacher Beliefs Survey total score was calculated along with a total mean for each of the five districts' eighth-grade EOG Mathematics Tests. An independent samples *t*-test was conducted to evaluate if a statistical difference existed between the higher-performing districts teachers scores on the level of learner-centered beliefs. The test results (t (10.6) = -.078, p =.939) rejected the null hypothesis at the $p > .05$ level of significance. Teachers in higher-performing districts were slightly more learner-centered than teachers in lower-performing districts.

Research Question 4. Is there a difference in the level of non-learner-centered beliefs about the learner between teachers in districts with a higher percentage of students who met or exceeded state standards on the eighth-grade EOG Mathematics Test? An independent samples t-test was performed to determine if a statistical difference existed between high-performing districts teacher scores on the level of non-learner-centered beliefs about the learner. Accordingly, test result, t (14) = .068, p = .947, supported the hypothesis that teachers in higher-performing districts were less non-learner-centered about the learners than teachers in lower-performing districts.

Research Question 5. Is there a difference in the level of non-learner-centered beliefs about teaching and learning between teachers in districts with a higher percentage of students who met or exceeded state standards on the eighth-grade EOG Mathematics Test than teachers in districts with a lower percentage of students who met or exceeded

state standards on the eighth-grade EOG Mathematics Test? An independent samples *t*-test was performed to determine if a statistical difference existed between higher-performing districts teacher and lower-performing districts teacher scores on the level of non-learner-centered beliefs about teaching and learning. The test result (t (14) = 1.403, p = .182) was counter to the hypothesis that teachers in higher-performing districts were less non-learner-centered about learners than teachers in lower-performing districts.

Consequently, there are at least four possible explanations that account for these findings. To begin with, in the initial validation and successive studies using the Teacher Beliefs Survey, researchers did not identify subject-specific teachers as the single focus of their study. Perhaps a unique set of variables exist among middle school mathematics teachers, including teacher preparation for mathematics, state licensure for teaching mathematics, mathematics pedagogy, and possibly mathematics curricula, that prevents the differentiation of learner-centered from non-learner-centered beliefs of the teacher.

With sample size in mind, the small sample size is a limitation and is considered a plausible explanation. At the same time, the validation means derived by McCombs and Whisler (1997) used in this study to ascertain the level of learner-centeredness may have been set too high. However, irrespective of the level of learner-centeredness, statistical analysis did not yield a statistical significant difference between the teachers from higher performing and lower-performing districts.

Finally, the differentiation of learner-centered from non-learner-centered beliefs of middle school mathematics instructors as measured by the Teacher Beliefs Survey may not be possible given variables or factors unique to middle school mathematics.

Limitations

Limitations of this study included the sample size, timing, and design. This study was intended to garner participation from all twelve of the Sandhills Regional Education Consortium districts; however, only five districts (n = 5) and sixteen teachers (n = 16) are represented in this study. Due to using post-hoc data for student achievement, some teachers were no longer employed with some of the participating districts. Additionally, the design of this study collected quantitative data only.

Lastly, it is possible that a type I error is associated with the small sample size (n = 16). Given that a type I error rejects a null hypothesis that is actually true (alpha error); the research hypotheses in this present study may have been true and a relationship and a difference does exist based on teachers level of learner-centered beliefs and non-learner-centered beliefs (Fraenkel & Wallen, 2006).

Recommendations

This study validates the premise that learner-centered beliefs and practices are not a program, but a personal model for addressing school reform as evidenced by the human element in each participant's response. Furthermore, this study highlights a need to explore professional development opportunities to support a learner-centered environment for professional growth as evidenced by only one of the sixteen teachers meeting the criteria for learner-centered. Future research into the number of years of experience (5 plus) teaching mathematics, the educational attainment of math teachers, and National Board Certified Teaching credentialing are worthy of investigation. Research comparing student learner-centered beliefs and teacher leaner-centered beliefs to student and teacher performance as well as observation of teachers in practice will

provide a clearer picture of learning-centered beliefs and practices. A longitudinal study on student growth overtime, ethnicity, and gender will add to the multiple facets of this study.

In summary, although the overall results of this study do not support the results found by McCombs and Whisler (1997), they do support the work of Niyozow (2009) that sustainable education reform must include the integral role of teachers in learner-centered pedagogy.

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Appendix A

Learner-Centered Psychological Principles

LEARNER-CENTERED PSYCHOLOGICAL PRINCIPLES

The following 14 psychological factors pertain to the learner and the learning process. They focus on psychological factors that are primarily internal to and under the control of the learner rather than conditioned habits or physiological factors. However, the principles also attempt to acknowledge external environment or contextual factors that interact with these internal factors. The principles are intended to deal holistically with learners in the context of real-world learning situations. Thus, they are best understood as an organized set of principles; no principle should be viewed in isolation. The 14 principles are divided into those referring to cognitive and metacognitive, motivational and affective, developmental and social, and individual difference factors influencing learners and learning. Finally, the principles are intended to apply to all learners-from children, to teachers, to administrators, to parents, and to community members involved in our educational system.

Cognitive and Metacognitive Factors

1. Nature of the learning process. The learning of complex subject matter is most effective when it is an intentional process of constructing meaning from information and experience.

   There are different types of learning processes; for example, habit formation in motor learning, and learning that involves the generation of knowledge or cognitive skills, and learning strategies. Learning in schools emphasizes the use of intentional processes that students can use to construct meaning from information, experiences, and their own thoughts and beliefs. Successful learners are active, goal-directed, self-regulating, and assume personal responsibility for contributing to their own learning.

2. Goals of the learning process. The successful learner, over time and with support and instructional guidance, can create meaningful, coherent representations of knowledge.

   The strategic nature of learning requires students to be goal directed. To construct useful representations of knowledge and to acquire the thinking and learning strategies necessary for continued learning success across the life span, students must generate and pursue personally relevant goals. Initially, students' short-term goals and learning may be sketchy in an area, but over time their understanding can be refined by filling gaps, resolving inconsistencies, and deepening their understanding of the subject matter so that they can reach longer-term goals. Educators can assist learners in creating meaningful learning goals that are consistent with both personal and educational aspirations and interests.

3. Construction of knowledge. The successful learner can link new information with existing knowledge in meaningful ways.

   Knowledge widens and deepens as students continue to build links between new information and experiences and their existing knowledge base. The nature of these

links can take a variety of forms, such as adding to, modifying, or reorganizing existing knowledge or skills. How these links are made or develop may vary in different subject areas and among students with varying talents, interests, and abilities. However, unless new knowledge becomes integrated with the learner's prior knowledge and understanding, this new knowledge remains isolated, cannot be used most effectively in new tasks, and does not transfer readily to new situations. Educators can assist learners in acquiring and integrating knowledge by a number of strategies that have been shown to be effective with learners of varying abilities, such as correct mapping and thematic organization or categorizing.

4. Strategic thinking. The successful learner can create and use a repertoire of thinking and reasoning strategies to achieve complex learning goals.

   Successful learners use strategic thinking in their approach to learning, reasoning, problem solving, and concept learning. They understand and can use a variety of strategies to help them reach learning and performance goals, and to apply their knowledge in novel situations. They also continue to expand their repertoire of strategies by reflecting on the methods they use to see which work well for them, by receiving guided instruction and feedback, and by observing or interacting with appropriate models. Learning outcomes can be enhanced if educators assist learners in developing, applying, and assessing their strategic learning skills.

5. Thinking about thinking. Higher order strategies for selecting and monitoring mental operations facilitate creative and critical thinking.

   Successful learners can reflect on how they think and learn, set reasonable learning or performance goals, select potentially appropriate learning strategies or methods, and monitor their progress toward these goals. In addition, successful learners know what to do if a problem occurs or if they are not making sufficient or timely progress toward a goal. They can generate alternative methods to reach their goal (or reassess the appropriateness and utility of the goal). Instructional methods that focus on helping learners develop these higher order (metacognitive) strategies can enhance student learning and personal responsibility for learning.

6. Context of learning. Learning is influenced by environmental factors, including culture, technology, and instructional practices.

   Learning does not occur in a vacuum. Teachers play a major interactive role with both the learner and the learning environment. Cultural or group influences on students can impact many educationally relevant variables, such as motivation, orientation toward learning, and ways of thinking. Technologies and instructional practices must be appropriate for learners' level of prior knowledge, cognitive abilities, and their learning and thinking strategies. The classroom environment, particularly the degree to which it is nurturing or not, can also have significant impacts on student learning.

Motivational and Affective Factors

7. Motivational and emotional influences on learning. What and how much is learned is influenced by the learner's motivation. Motivation to learn, in turn, is influenced by the individual's emotional states, beliefs, interests and goals, and habits of thinking.

   The rich internal world of thoughts, beliefs, goals, and expectations for success or failure can enhance or interfere with the learner's quality of thinking and information processing. Students' beliefs about themselves as learners and the nature of learning have a marked influence on motivation. Motivational and emotional factors also influence both the quality of thinking and information processing as well as an individual's motivation to learn. Positive emotions, such as curiosity, generally enhance motivation and facilitate learning and performance. Mild anxiety can also enhance learning and performance by focusing the learner's attention on a particular task. However, intense negative emotions (e.g., anxiety, panic, rage, insecurity) and relative thoughts (e.g., worrying about competence, ruminating about failure, fearing punishment, ridicule or stigmatizing labels) generally detract from motivation, interfere with learning, and contribute to low performance.

8. Intrinsic motivation to learn. The learner's creativity, higher order thinking, and natural curiosity all contribute to motivation to learn. Intrinsic motivation is stimulated by tasks of optimal novelty and difficulty relevant to personal interests, and providing for personal choice of control.

   Curiosity, flexible and insightful thinking, and creativity are major indicators of the learners' intrinsic motivation to learn, which is in large part a function of meeting basic needs to be competent and to exercise personal control. Intrinsic motivation is facilitated on tasks that learners perceive as interesting and personally relevant and meaningful, appropriate in complexity and difficulty to the learners' abilities, and on which they believe they can succeed. Intrinsic motivation is also facilitated on tasks that are comparable to real-world situations and meet needs for choice and control. Educators can encourage and support learners' natural curiosity and motivation to learn by attending to individual differences in learners' perception of optimal novelty and difficulty, relevance, and personal choice and control.

9. Effects of motivation and effort. Acquisition of complex knowledge and skills requires extended learner effort and guided practice.

   Without learners' motivation to learn, the willingness to exert this effort is unlikely without coercion. Effort is another main indicator of motivation to learn. The acquisition of complex knowledge and skills demands the investment of considerable learner energy and strategic effort, along with persistence over time. Educators need to be concerned with facilitating motivation by strategies that enhance learner effort and commitment to learning and to achieving high standards of comprehension and understanding. Effective strategies include purposeful learning activities, guided by practices that enhance positive emotions and intrinsic motivation to learn, and

methods that increase learners' perceptions that a task is interesting and personally relevant.

Developmental and Social Factors

10. Developmental influences on learning. As individuals develop, there are different opportunities and constraints for learning. Learning is most effective when differential development within and across physical, intellectual, emotional, and social domains is taken into account.

    Individuals learn best when material is appropriate to their developmental level and is presented in an enjoyable and interesting way. Because individual development varies across intellectual, social, emotional, and physical domains, achievement in different instructional domains may also vary. Overemphasis on one's type of developmental readiness—such as reading readiness, for example—may preclude learners from demonstrating that they are more capable in other areas of performance. The cognitive, emotional and social development of individual learners and how they interpret life experiences are affected by prior schooling, home, culture, and community factors. Early and continuing parental involvement in schooling, and the quality of language interactions and two-way communications between adults and children can influence these developmental areas. Awareness and understanding of developmental differences among children with and without emotional, physical, or intellectual disabilities, can facilitate the creation of optimal learning contexts.

11. Social influences on learning. Learning is influenced by social interactions, interpersonal relations, and communication with others.

    Learning can be enhanced when the learner has an opportunity to interact and to collaborate with others on instructional tasks. Learning settings that allow for social interactions, and that respect diversity, encourage flexible thinking and social competence. In interactive and collaborative instructional contexts, individuals have an opportunity for perspective taking and reflective thinking that may lead to higher levels of cognitive, social, and moral development, as well as self-esteem. Quality personal relationships that provide stability, trust, and caring can increase learners' sense of belonging, self-respect and self-acceptance, and provide a positive climate for learning. Family influences, positive interpersonal support and instruction in self-motivation strategies can offset factors that interfere with optimal learning such as negative beliefs about competence in a particular subject, high levels of test anxiety, negative sex role expectations, and unique pressure to perform well. Positive learning climates can also help to establish the context for healthier levels of thinking, feeling, and behaving. Such contexts help learners feel safe to share ideas, actively participate in the learning process, and create a learning community.

Individual Differences Factors

12. Individual differences in learning. Learners have different strategies, approaches, and

capabilities for learning that are a function of prior experience and heredity.

Individuals are born with and develop their own capabilities and talents. In addition, through learning and social acculturation, they have acquired their own preferences for how they like to learn and the pace at which they learn. However, these preferences are not always useful in helping learners reach their learning goals. Educators need to help students examine their learning preferences and expand or modify them, if necessary. The interaction between learner differences and curricular and environmental conditions is another key factor affecting learning outcomes. Educators need to be sensitive to individual differences, in general. They also need to attend to learner perceptions of the degree to which these differences are accredited and adapted to by varying instructional methods and materials.

13. Learning and diversity. Learning is most effective when differences in learners' linguistic, cultural, and social backgrounds are taken into account.

    The same basic principles of learning, motivation, and effective instruction apply to all learners. However, language, ethnicity, race, beliefs, and socioeconomic status all can influence learning. Careful attention to these factors in the instructional setting enhances the possibilities for designing and implementing appropriate learning environments. When learners perceive that their individual differences in abilities, backgrounds, cultures, and experiences are valued, respected, and accommodated in learning tasks and contexts, levels of motivation and achievement are enhanced.

14. Standards and assessment. Setting appropriately high and challenging standards and assessing the learner as well as learning progress including diagnostic, process, and outcome assessment are integral parts of the learning process.

    Assessment provides important information to both the learner and teacher at all stages of the learning process. Effective learning takes place when learners feel challenged to work towards appropriately high goals. Therefore, appraisal of the learner's cognitive strengths and weaknesses, as well as current knowledge and skills, is important for the selection of instructional materials of an optimal degree of difficulty. Ongoing assessment of the learner's understanding of the curricular material can provide valuable feedback to both learners and teachers about progress toward the learning goals. Standardized assessment of learner progress and outcomes assessment provides one type of information about achievement levels both within and across individuals that can inform various types of programmatic decisions. Performance assessments can provide other sources of information about the attainment of learning outcomes. Self-assessments of learning progress can also improve students' self-appraisal skills and enhance motivation and self-directed learning.

Appendix B

Teacher Beliefs Survey

Part I Background/Demographic Information

Select your response to following questions.

1. The total number of total years teaching

   A 1-4
   B 5-9
   C 10-15
   D 16-23
   E 24+

2. What was your Major area of teaching preparation?

   A Mathematics
   B Science
   C Language Arts
   D Social Studies
   E Other

3. The total number of total years teaching mathematics

   A 1-4
   B 5-9
   C 10-15
   D 16-23
   E 24+

4. What was your Minor area of teaching preparation?

   A Mathematics
   B Science
   C Language Arts
   D Social Studies
   E Other

5. The total number of total years teaching middle school mathematics

   A 1-4
   B 5-9
   C 10-15
   D 16-23
   E 24+

6. What is the Highest degree earned?

   A BA/BS
   B MA/MS
   C Ed.D./Ph.

Optional questions

7. What is your age range?

   A 21-25
   B 26-30
   C 31-35
   D 36-40
   E 41+

8. What is your ethnicity?

   A Caucasian American
   B African American
   C Hispanic/Latino
   D Asian
   E Native American
   F Other

9. What is your sex?

   A Male
   B Female

Part II Teacher Beliefs Survey

THE ASSESSMENT OF LEARNER-CENTERED PRACTICES

(ALCP):

Middle Level <u>TEACHER</u> Survey (Grade 8) ©

<u>DIRECTIONS for Part II</u>: A number of statements that teachers in Grades 4 through 8 have used to describe themselves are shown below. Please read each statement carefully. Decide **to what extent** you agree or disagree with each statement. Do you *strongly disagree, somewhat disagree, somewhat agree,* or *strongly agree*? Select the appropriate number located in the box corresponding with each statement to indicate your choice. Answer carefully, but don't think too much about any one question.

PLEASE ANSWER EVERY QUESTION. Your responses will be kept private and confidential.

Responses:

1=Strongly Disagree, 2=Somewhat Disagree, 3=Somewhat Agree, 4=Strongly Agree

Statement	Strongly Disagree	Somewhat Disagree	Somewhat Agree	Strongly Agree
1. Students have more respect for teachers they see and can relate to as real people, not just as teachers.	1	2	3	4
2. There are some students whose personal lives are so dysfunctional that they simply do not have the capability to learn.	1	2	3	4
3. I can't allow myself to make mistakes with my students.	1	2	3	4

Teacher Beliefs Survey (cont.)

Statement	Strongly Disagree	Somewhat Disagree	Somewhat Agree	Strongly Agree
4. Students achieve more in classes in which teachers encourage them to express their personal beliefs and feelings.	1	2	3	4
5. Too many students expect to be coddled in school.	1	2	3	4
6. If students are not doing well, they need to go back to the basics and do more drill and skill development.	1	2	3	4
7. In order to maximize learning, I need to help students feel comfortable in discussing their feelings and beliefs.	1	2	3	4
8. It's impossible to work with students who refuse to learn.	1	2	3	4
9. No matter how bad a teacher feels, he or she has a responsibility not to let students know about those feelings.	1	2	3	4
10. Addressing students' social, emotional, and physical needs is just as important to learning as meeting their intellectual needs.	1	2	3	4
11. Even with feedback, some students just can't figure out their mistakes.	1	2	3	4
12. My most important job as a teacher is to help students meet well established standards of what it takes to succeed.	1	2	3	4

Teacher Beliefs Survey (cont.)

Statement	Strongly Disagree	Somewhat Disagree	Somewhat Agree	Strongly Agree
13. Taking the time to create caring relationships with my students is the most important element for student achievement.	1	2	3	4
14. I can't help feeling upset and inadequate when dealing with difficult students.	1	2	3	4
15. If I don't prompt and provide direction for student questions, students won't get the right answer.	1	2	3	4
16. Helping students understand how their beliefs about themselves influence learning is as important as working on their academic skills.	1	2	3	4
17. It's just too late to help some students.	1	2	3	4
18. Knowing my subject matter really well is the most important contribution I can make to student learning.	1	2	3	4
19. I can help students who are uninterested in learning get in touch with their natural motivation to learn.	1	2	3	4
20. No matter what I do or how hard I try, there are some students who are unreachable.	1	2	3	4
21. Knowledge of the subject area is the most important part of being an effective teacher.	1	2	3	4

Teacher Beliefs Survey (cont.)

Statement	Strongly Disagree	Somewhat Disagree	Somewhat Agree	Strongly Agree
22. Students will be more motivated to learn if teachers get to know them at a personal level.	1	2	3	4
23. Innate ability is fairly fixed and some children just can't learn as well as others.	1	2	3	4
24. One of the most important things I can teach students is how to follow rules and to do what is expected of them in the classroom.	1	2	3	4
25. When teachers are relaxed and comfortable with themselves, they have access to a natural wisdom for dealing with even the most difficult classroom situations.	1	2	3	4
26. Teachers shouldn't be expected to work with students who consistently cause problems in class.	1	2	3	4
27. Good teachers always know more that their students.	1	2	3	4
28. Being willing to share who I am as a person with my students facilitates learning more than being an authority figure.	1	2	3	4
29. I know best what students need to know and what's important; students should take my word that something will be relevant to them.	1	2	3	4

Teacher Beliefs Survey (cont.)

Statement	Strongly Disagree	Somewhat Disagree	Somewhat Agree	Strongly Agree
30. My acceptance of myself as a person is more central to my classroom effectiveness than the comprehensiveness of my teaching skills.	1	2	3	4
31. For effective learning to occur, I need to be in control of the direction of learning.	1	2	3	4
32. Accepting students where they are—no matter what their behavior and academic performance—makes them more receptive to learning.	1	2	3	4
33. I am responsible for what students learn and how they learn.	1	2	3	4
34. Seeing things from the students' point of view is the key to their good performance in school.	1	2	3	4
35. I believe that just listening to students is a caring way helps them solve their own problems.	1	2	3	4

Appendix C

Informed Consent Letters

Dear Superintendent/Assistant Superintendent,

I am asking for your help in assisting me with my doctoral dissertation that seeks to conduct an initial study to identify, determine a difference, if any, and investigate any possible relationship between the role of teacher beliefs about learner-centered education with student achievement. Your decision to participate is voluntary.

Specifically, I am asking that you provide each of your mathematics teachers who taught eighth-grade mathematics during the 2010-2011 school year the Teacher Beliefs Survey that includes: Overview, Instructions, and the Teacher Beliefs Survey. The Teacher Beliefs Survey is can be accessed via https://www.surveymonkey.com/s/RZMH7H6 until February 28th is completely confidential and does not ask any staff member to identify him or herself. The survey will not take any longer than 5 minutes to complete. **There are no risks associated with completing the survey.**

Why YOUR district? YOUR district was selected because it is part of the Sandhills Regional Education Consortium (SREC) and based on the results of the 2011 North Carolina Eighth-Grade End-of-Grade Mathematics Test. Please know that I am fully aware that the EOG results are merely a starting point and in no way take into account the many challenges, obstacles, or barriers that you and your staff contend with day in and day out.

Unlike previous research on school reform that has tended for the most part to address technical and organizational changes in our present system, this study seeks to ascertain if there is a difference as well as if a relationship exists between learner-centered beliefs and student achievement. Why learner-centered? Researchers at the Mid-continent Regional Educational Laboratory (McREL) identified an additional domain of reform that in their estimation has seldom, if ever, been studied. That domain includes defining and examining teacher beliefs and practices considered learner-centered and the degree to which student achievement, motivation, and learning is influenced.

The results of the study will provide you and your mathematics teachers the level of (1) Learner-Centered Beliefs about Learners, Teaching and Learning; (2) Non-learner-Centered Beliefs About Learners; and (3) Non-learner-Centered Beliefs About Teaching and Learning. Additionally, the results of this study will provide you the answers to several research questions investigating differences and/or relationships between and among the learner-centered beliefs and student achievement of different middle schools within the SREC.

As I indicated, I will return to you the findings of the study as well as your specific school's survey results accompanied by some general recommendations that may assist you with the work of improving student learning and achievement of all students. Again, all I am asking is for you to request teachers who taught eighth-grade mathematics during the 2010-2011 school year to complete the Teacher Beliefs Survey located online at https://www.surveymonkey.com/s/RZMH7H6. Knowing full well the demands on your time, please accept my sincerest appreciation for assisting me with this project. If you or any of your staff have any questions, please do not hesitate to contact me either by

phone (XXX-XXX-XXXX) or by email (XXXXXX).

Thank you in advance for your support.

Takeda LeGrand
Doctoral Candidate
Gardner-Webb University

Dear Staff,

I am asking for your help in assisting me with my doctoral dissertation that seeks to conduct an initial study to identify, determine a difference, if any, and investigate any possible relationship between the role of teacher beliefs about learner-centered education with student achievement. Your decision to participate is voluntary.

Specifically, I am asking that you complete the Teacher Beliefs Survey by February 28th. The web address at https://www.surveymonkey.com/s/RZMH7H6 will provide you with: An Overview, Instructions, and the Teacher Beliefs Survey. The Teacher Beliefs Survey is completely confidential and does not ask you to identify yourself. The survey will not take any longer than 5 minutes to complete. **There are no risks associated with completing the survey.**

Middle School was selected because it is part of the Sandhills Regional Education Consortium (SREC) and based on the results of the 2011 North Carolina Eighth-Grade End-of-Grade Mathematics Test. Please know that I am fully aware that the EOG results are merely a starting point and in no way take into account the many challenges, obstacles, or barriers that you and your staff contend with day in and day out.

Unlike previous research on school reform that has tended for the most part to address technical and organizational changes in our present system, this study seeks to ascertain if there is a difference as well as if a relationship exists between learner-centered beliefs and student achievement. Why learner-centered? Researchers at the Mid-continent Regional Educational Laboratory (McREL) identified an additional domain of reform that in their estimation has seldom, if ever, been studied. That domain includes defining and examining teacher beliefs and practices considered learner-centered and the degree to which student achievement, motivation, and learning is influenced.

The results of the study will provide you the level of (1) Learner-Centered Beliefs about Learners, Teaching and Learning; (2) Nonlearner-Centered Beliefs About Learners; and (3) Nonlearner-Centered Beliefs About Teaching and Learning. Additionally, the results of this study will provide you the answers to several research questions investigating differences and/or relationships between and among the learner-centered beliefs and student achievement of different middle schools within the SREC.

As I indicated, I will return to you the findings of the study as well as your specific school's survey results accompanied by some general recommendations that may assist you with the work of improving student learning and achievement of all students.

Again, all I am asking is for you to complete the Teacher Beliefs Survey located at the following address at https://www.surveymonkey.com/s/RZMH7H6. Knowing full well the demands on your time, please accept my sincerest appreciation for assisting me with this project. If you have any questions, please do not hesitate to contact me either by phone (XXX-XXX-XXXX) or by email (XXXXX).

Thank you in advance for your support.

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