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Evaluation of the Relationship of Learner-Centered Beliefs of Seventh Grade Mathematics Teachers and Student Achievement on the Mathematics Section of the North Carolina End-Of-Grade Assessment

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This dissertation was submitted by Mary Steltz 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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This dissertation was designed to examine the personal domain in systemic reform. In an effort to improve student achievement, this study focused on accountability reform. The learner-centered model was based on what teachers believe about teaching and learning and how student motivation and achievement was influenced by those beliefs. Teacher practices, beliefs and behaviors had the greatest impact on student learning; therefore this study sought to establish identification of learner-centered teachers and their effectiveness on student achievement on the seventh grade mathematics section of the North Carolina End-of-Grade Assessment.

A non-experimental quantitative study design was used to examine teacher's beliefs about the learner, learning, and teaching as well as the impact of their beliefs on mathematics student achievement. The researcher collected data via the Teacher Beliefs Survey and student achievement on the mathematics section of the seventh grade 2011 North Carolina End-of-Grade Assessment. The 35-item Teacher Beliefs Survey generated Likert-scale data, which was stored and analyzed in a Statistical Package for Social Sciences (Green, Salkind, & Akey, 2000). Differences in survey responses of teachers and the learner-centered beliefs of teachers using: 1) a T-test for simple differences and 2) an Analysis of Variance (ANOVA) to compare the differences within and between two or more means were analyzed. Differences were found in the means between and within groups, but the results failed the statistical significance threshold. Descriptive statistics including means and standard deviation were reported, as well as the Pearson Product Moment Correlational Coefficient to determine if, and to what extent, the relationship between one or more variables existed. Three different correlations were conducted to examine possible relationships between both learner-centered and non-learner-centered groups and total score and mean scale scores. Statistical significance was found to exist between the learner-centered beliefs and non-learner-centered beliefs, as well as the non-learner-centered beliefs for learners and non-learner-centered beliefs for teaching and learning with a statistical significance >.35 for total score. The mean scale score correlation for learner-centered beliefs, non-learner-centered beliefs for learners, and non-learner-centered beliefs for teaching and learning each failed statistical significance.

Though the findings of this study were less than dramatic, they are informative for educators interested in identifying variables influencing both student learning and achievement. Findings in this study did not support the results found by McCombs and Whisler (1997); however, it did support the assertion by Lezotte (1997) and Bowsher (2001) that educational reform has shifted from teacher-centered to learning-centered but has not yet transformed to learner-centered.

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Chapter 1: Introduction

Background of Study on Mathematics Achievement

The 2000 National Assessment of Educational Progress (NAEP) indicated that only 26% of fourth graders, 27% of eighth graders, and 17% of twelfth graders performed at proficient levels in mathematics, a small increase since the 1990 assessment (U.S. Department of Education, 2001). Although there was a 7% increase for eighth-grade students in mathematics achievement, students were 34% at or above proficiency on the 2009 assessment, nearly a decade later (U. S. Department of Education, 2011) (see Appendix A).

Other assessments, for example, the 2007 report from Trends in International Mathematics and Science Study (TIMSS), summarized fourth and eighth-grade students' mathematics achievement from 59 participating countries. This data was collected and reported every 4 years. Student performance on the 2007 benchmarks revealed that achievement in mathematics in the United States was consistently stagnant where the best results were obtained on the low benchmarks for both fourth and eighth graders, instead of the advanced benchmarks. The countries that ranked higher than the United States on the TIMSS report in mathematics achievement were Chinese Taipei, Korea, Singapore, Hong Kong, and Japan (TIMSS, 2008) (see Appendix B).

A similar 2009 international study by the Program for International Student Assessment (PISA), through the Organization for Economic Cooperation and Development, consisted of 65 countries participating in the evaluation of skills and knowledge of 15-year-olds. PISA assessed what skills and knowledge students had acquired in order to function in society. This report provided the world's most extensive and rigorous set of international surveys assessing the knowledge and skills of secondary

school students. The results of the 2009 assessment of 15-year-olds in the United States revealed that 27% scored at or above proficiency level 4. This was lower than the 32% of students in other countries; for example, Finland, Germany, Japan and Switzerland scored at or above level 4 (OECD-PISA, 2009). Further, level 4 was the level at which students could complete higher order thinking skills such as problem solving, using visual and spatial reasoning and following sequencing processes (OECD-PISA, 2009) (see Appendix C).

In response to these harrowing reports, school systems across America launched initiatives and reforms to address mathematics proficiency in their districts.

School Reform

"The educational arena has faced many reform challenges over the past decades, but the difficulty was grounded in creating enduring systemic change that met the expectations and high standards of achievement in every classroom in America" (Lezotte, 1997).

Schools all across America have attempted to address the issue of low-performance in mathematics achievement with various reform strategies. Much research has been conducted and findings supported effective instructional practices that established high expectations, matched instruction to student needs, created a positive classroom environment, provided clear and effective instruction with immediate feedback, and increased academic engagement (Ball & Cohen, 1996; Fuson, De La Cruz, Lo Cicero, Smith, Hudson, & Steeby, 2000; Spillane & Zeuli, 1999).

The Elementary and Secondary Education Act (ESEA) of 2002, known as the No Child Left Behind Act (NCLB) of 2001, was signed into law by President George W. Bush. This law was enacted to compel American school systems to develop

comprehensive school reforms with an emphasis on basic academics that would enable students to meet challenging academic standards (U. S. Department of Education, 2011).

Federal monies and grant awards were provided as incentives for local school systems to provide literacy and accountability for the success of all students, special accommodations for at-risk students, and programs that would include parental involvement in educational activities.

The Secretary of Education, Arne Duncan, made the following statement on *Good Morning America* on March 15, 2010, "The No Child Left Behind Act is too punitive and prescriptive. It leads to a lowering down of standards, and narrows the curriculum."

President Obama's new initiative entitled Race to the Top (RttT), was a new partnership which was designed to reverse NCLB and help school systems prepare students to be college and career ready. According to Secretary Duncan, RttT's focus was not just on math and reading, but provided a well-rounded education for all students with shared responsibility and partnerships with the federal government, school systems, principals, teachers, and states (*Good Morning America*, 2010).

To date, NCLB seemed to expose the reality that a majority of students had not attained proficiency levels as expected, and the achievement gap between various groups had not been closed. This reality forced the federal government to look at reform and reauthorization of the ESEA to compensate for the failure of the previous reform initiative.

Consequently, school reform was a major task that could not be accomplished overnight. Many school leaders and educators confirmed that successful reform had to be implemented in small steps, with small changes over a period of time.

Marzano, McNulty, and Waters (2005) provided practical insight about school

reform and systemic change. According to the researchers, there were two orders of change. A first-order change, which was gradual and incremental, was needed to manage day-to-day school activities. The change was viewed as an extension of the past, aligned within existing paradigms and consistent with prevailing norms and values.

A second-order change was a complete overhaul that took time and consistent management from all levels in a school system. This change was viewed as a break from the past, was outside of existing paradigms, and conflicted with prevailing norms and values. Most important about the second-order change was that it required new knowledge and skills (Marzano et al., 2005).

Mid-continent Regional Educational Laboratory (McREL) (2000) provided nine powerful instructional practices for improving mathematics achievement for students in all grades. Researchers included the following: summarizing and note-taking, reinforcing effort and providing recognition, homework and practice, nonlinguistic representations (drawings), identifying similarities and differences, cooperative learning, setting objectives and providing feedback, generating and testing hypotheses or proofs, cues and questions, and advance organizers.

Similarly, based on the standards in *Curriculum and Evaluation Standards for School Mathematics* (1989) developed by the National Council of Teachers of Mathematics (NCTM), these nine standards could be observed in every learner-centered classroom (see Appendix D).

Education in America needed an overhaul. A thorough review of the structural design of the educational domain and effective strategies had to occur in order to develop comprehensive systemic reform (Marzano & Kendall, 1996; Marzano & Kendall, 1999). This examination demanded an inclusive review of all aspects of the educational system.

Researchers at McREL identified and organized their work on systemic reform around three primary domains or subsystems of educational systems: Personal, Technical and Organizational (McCombs & Whisler, 1997). A brief overview of each of the domains follows.

The personal domain included all stakeholders in the educational system, their attitudes, beliefs, and assumptions about learning, readiness for change, understanding of the change process, interactions among all involved in the system, and the comprehensive dynamics and psychology of change (Marzano & Kendall, 1999; McCombs & Whisler, 1997). Consistent with this view, Fullan asserted that working collaboratively often necessitated overcoming problems that decreased enthusiasm for change (Fullan, 1992-1993).

The second domain, referred to as the technical domain, included the following: curriculum, learning and the development of instructional strategies, implementation of standards, assessment, and educational technology (Marzano & Kendall, 1999; McCombs & Whisler, 1997).

Finally, "the organizational domain includes policies, management structures, community support for the school system, procedures to implement innovations, political issues, and organizational reputation and history" (Marzano & Kendall, 1999; McCombs & Whisler, 1997).

The three domains identified by McREL set the foundational stage for future work. A host of research has been conducted on two of those domains, but the American Psychological Association (APA) concluded that educational reform in the past had only focused on the technical and organizational components of school systems. In 1990, the APA appointed a special Task Force on Psychology in Education to identify general

principles that could provide a framework for reform and redesign of schools (McCombs & Whisler, 1997). Coupled with the researchers at McREL, the APA Task Force identified 12 basic principles, called the Learner-Centered Psychological Principles (LCPs), about learners and learning that provided a new perspective on factors that influence learning for all learners (APA, 1993). The APA revised this document in 1997, and it now includes 14 principles with the addition of diversity and standards (APA, 1997).

The 14 learner-centered principles were categorized into four domains. These categories grouped the principles into research-validated domains important to learning. They were (1) metacognitive and cognitive factors, (2) affective and motivational factors, (3) developmental and social factors, and (4) individual difference factors (APA, 1993, 1997). "The principles within the domains establish a framework for designing learner-centered practices at all levels of schooling, and help define what 'learner-centered' means from a research-validated perspective" (APA, 1997, p. 2) (Alexander & Murphy, 1998; Lambert & McCombs, 1998; McCombs, 1993, 1994, 1995; McCombs & Whisler, 1997). McCombs (2000) defined learner-centered as, "Educational models that reconnect learners with others and with learning—models that are person-centered while also addressing the needs for challenging learning experiences" (p. 2), which connected the personal domain to the process.

Emerging from the learner-centered principles was the Learner-Centered Battery (LCB) (McCombs, 1994, 1995, 1996). The LCB was developed from the LCPs (APA, 1993, 1997) and assessed teachers' beliefs about learners, learning, and teaching. Teachers' perceptions of their domains of practice in the classroom and students' perceptions in these same domains were also assessed (McCombs & Lauer, 1997).

A plethora of research studies about the presence of learner-centered beliefs in the validation of the LCB resulting in higher student achievement has been conducted (Alexander & Murphy, 1998; Lambert & McCombs, 1998; McCombs, 1993, 1994, 1995; McCombs & Whisler, 1997).

Statement of Problem

In 2009, the National Assessment of Educational Progress (NAEP) released results on differences in the achievement of black and white students. That same year House Bill 804, a measure that would amend the law regarding personal education plans (PEPs) for students at risk of academic failure, was introduced and implemented in an effort to improve student learning and achievement in reading and mathematics on the North Carolina End-Of-Grade (EOG) assessments (NCDPI, n.d.).

Weinberger and McCombs (2001) asserted that classrooms that had positive, personal relationships, honored student voice, utilized higher-order thinking, and accounted for individual differences were most important to high motivation and achievement. The personal domain, consisting of teacher beliefs and expectations, was in need of study.

The trend in North Carolina mathematics achievement showed that students peaked out at 89% proficiency in the 2003-2004 school year. Since that time, student scores plummeted to 63% in the 2005-2006 school year and had increased to 81% for the 2009-2010 school year (NCDPI, n.d.). The achievement results suggest that previous reforms had not been successful. Moreover, North Carolina had been on a rocky path with mathematics achievement over the past decade (NCDPI, n.d.). The inability to clearly identify the factors or variables that correlated with improved student achievement in mathematics as measured by North Carolina's EOG assessment served as

the momentum to examine the role and relationship of the personal domain, not the technical or organizational aspects of reform.

Purpose of the Study

The purpose of this study was to explore why mathematics achievement in seventh grade had not improved. The researcher sought to examine the relationship of the learner-centered beliefs of seventh grade mathematics teachers and their students' performance on the mathematics section of the North Carolina EOG Assessment as a vehicle for improving student achievement.

Research Hypotheses

The researcher explored the following four hypotheses: 1) Students who met (Level III) or exceeded (Level IV) state standards on the mathematics section of the North Carolina End-of-Grade (EOG) Assessment were taught by teachers who used learner-centered practices and had high learner-centered beliefs; 2) Students who did not meet (Level III) state standards on the mathematics section of the North Carolina EOG Assessment were taught by teachers who did not use learner-centered practices and had non-learner-centered beliefs; 3) There is a higher correlation between student performance on the seventh grade mathematics section of the North Carolina EOG Assessment with teachers with learner-centered beliefs; and 4) There is a higher inverse correlation between student performance on the seventh grade mathematics section of the North Carolina EOG Assessment with teachers with non-learner-centered beliefs.

Research Questions

Underpinning and guiding the purpose of this study were several research questions that are in two distinct categories. The first category consisted of questions designed to determine if there were differences between seventh grade mathematics

teachers on their learner-centered beliefs based on geographic location, school size, or school district.

The second category consisted of questions to examine the relationship of learner-centered beliefs of seventh grade mathematics teachers and student achievement based on their school's performance data. They were as follows:

1. What is the level of learner-centered beliefs by seventh grade mathematics teachers?

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 seventh grade mathematics section of the North Carolina EOG Assessment?

3. Is there a difference in the level of learner-centered beliefs about the learner between teachers in schools with a higher percentage of students who met or exceeded state standards on the math section of the North Carolina EOG than those teachers with a lower percentage of students who met or exceeded state standards on the math section of the North Carolina EOG?

4. Is there a difference in the level of non-learner-centered beliefs about the learner between teachers in schools with a higher percentage of students who met or exceeded state standards on the math section of the North Carolina EOG than those teachers with a lower percentage of students who met or exceeded state standards on the math section of the North Carolina EOG?

5. Is there a difference in the level of non-learner-centered beliefs about teaching and learning between teachers in schools with a higher percentage of students who met or exceeded state standards on the math section of the North Carolina EOG than those

teachers with a lower percentage of students who met or exceeded state standards on the math section of the North Carolina EOG?

6. What is the relationship of learner-centered beliefs held by teachers to student performance on the seventh grade mathematics section of the North Carolina EOG?

Significance of the Study

The significance of this research study was two-fold in purpose and design. First, the study was non-experimental by design. Second, it was a quantitative study where the relationship between the learner-centered beliefs of seventh grade mathematics teachers and the performance of their students on the mathematics section of the North Carolina EOG Assessment has been determined. To that end, this present study intended to establish a foundation for future predictive studies. If the relationship between learner-centered beliefs and student performance was found to be highly correlated, it may lead to the possibility of conducting studies to determine, specifically, the predictive nature of learner-centered beliefs and student performance on the North Carolina EOG Assessment.

By seeking to determine the level of relationship of learner-centered beliefs and student achievement, this study furthered the research of McCombs and others. Specifically, McCombs (1997) stated that student achievement was improved in school districts where the learner-centered beliefs of teachers, accompanied by perceptions of learner-centered beliefs of students, had been identified. However, the research had not been replicated in North Carolina. The relationship between learner-centered beliefs and the North Carolina EOG Assessment had not been conducted. Although this was a correlational study and as such could not establish cause and effect (Schumacher & McMillan, 2005), the learner-centered beliefs represented a vehicle to examine the

personal domain or subsystem of school reform that had been either overlooked or neglected. This, in and of itself, added to our collective knowledge about educational reform.

Limitations of the Study

This study did not take into account the different levels of mathematics courses offered at the seventh grade level, control the level of mathematics preparation, or consider the years of experience of mathematics teachers. Validation of the teacher perceptions was not included in this study. For the purpose of this study, the terms learner-centered and student-centered was used synonymously, as they are working definitions, which focused on the learner. Participants were chosen based on student performance on spring 2011 mathematics section of the North Carolina EOG Assessment (provided by the North Carolina Department of Public Instruction). Finally, the student data used was *ex post facto*, which simply means that it was obtained after-the-fact.

Conclusion and Overview of Chapters

An expansive literature review of previous research is presented in Chapter 2. The primary focus is on previous research that relates to the purpose of this study. Following the forethought of Ellis and Fouts (1998), the literature review follows the three levels of research. The three levels of research are 1) the construct of learner-centered beliefs; 2) applied research on learner-centered beliefs as it relates to student achievement; and 3) research that evaluates the overall effects of learner-centered beliefs and student achievement.

The second component of Chapter 2 examines the role of teacher beliefs and expectations. In a similar fashion, the three levels of research served to organize this component. Finally, the review of literature concludes with the justification and rationale

for this study.

Chapter 3 describes in detail the methodology and methods employed in this study. Chapter 4 includes the results of descriptive and inferential statistics as well as their analysis. Lastly, Chapter 5 analyzes and discusses the results, summarized and concludes the study with recommendations for future consideration.

Definition of Terms

Adequate Yearly Progress (AYP). A statistical measure of student progress on an annual basis in reading and mathematics

End-of-Grade Test (EOG). State exams that measure student performance on the North Carolina Standard Course of Study in reading and mathematics.

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 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 teacher's beliefs about learners, learning, 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 2001. The most recent reauthorization of the Elementary and Secondary Education Act (ESEA) 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 was for every school to be at 100% proficiency by 2013-14, as measured by state assessments.

Disaggregation. To separate (an aggregate or mass) into its component parts.

Chapter 2: Review of Literature

Three Levels of Research

Ellis and Fouts (1998) created a framework that identified three levels of research. The design of this review utilized this framework as the instrument for reviewing the learner-centered psychological principles. Ellis and Fouts (1998) defined the three levels of research as follows:

> Level I is theory building, or pure research, or both; Level II is empirical research, either quantitative, qualitative, or a combination thereof; and Level III is program evaluation where it became possible to learn the extent to which a program or curriculum was successful when its implementation became widespread in schools or entire districts (p. 10).

This current review of literature is organized in three parts, corresponding with the three levels of research identified by Ellis and Fouts (1998). The precursors to the learner-centered psychological principles and initial research is explored in the Level I research section. Foundational research reviewed in section 1 includes, but was not limited to, the theoretical research by the American Psychological Association (APA) and Mid-continent Regional Educational Laboratory (McREL) Task force (1993), McCombs (1993, 1994, 1997, 1998, 2001), McCombs & Lauer (1997), and Alexander and Murphy (1998) studies.

Primary to the Level II research section is a review of the validation and initial findings of the instrument developed to identify learner-centered practices and behaviors of teachers (Lambert & McCombs, 1997; McCombs, 1993, 1994; McCombs & Lauer, 1997). The final section of the Level II research concludes with an exploration of studies

measuring learner-centered practices and behaviors of teachers relating to the motivation and achievement of students. Currently, very few studies had been conducted to specifically examine the relationship of the learner-centered practices with student motivation and achievement. Given this limitation, research conducted on specific principles or attributes of the learner-centered framework is presented. This research specified the need for investigating purposefully and intentionally the correlation of student motivation and achievement with learner-centered beliefs and practices of teachers.

The third section includes Level III research that is a brief summary of the program evaluation where learner-centeredness has been implemented at the school and school district level. Studies presented were focused on determining either a difference or relationship between student motivation and achievement and learner-centered practices at the school and/or school district level. As with Level II research, previous studies focused on these platforms were limited. However, research from whole school reform efforts provides valuable insight to the correlation of student achievement with aspects of learner-centered beliefs and practices.

Finally, this review of literature summarizes each of the three levels of research utilizing the framework defined by Ellis and Fouts (1998) concluding with an argument to specifically study the correlation of learner-centered beliefs and practices of seventh grade mathematics teachers with student achievement.

Level I Research

According to Ellis and Fouts (1998), "Level I research is basic or pure research on learning and behavior. Its purpose is to establish a theoretical construct or idea as having some validity" (p. 24). To review the validity of the learner-centered psychological

principles, this section is divided into six sections: 1) History of the Learner-Centered Psychological Principles, 2) Development and Validation Process, 3) The Four Domains, 4) Definition of Learner-Centered, 5) Premises of Learner-Centered Learning, and 6) A Summary of the Learner-Centered Psychological Principles.

History of the Learner-Centered Psychological Principles

In response to a call for a framework that would stand the test of time for school redesign and reform, the Learner-Centered Work Group of the American Psychological Association's (APA) Board of Education Affairs developed the Learner-Centered Psychological Principles (LCPs) (APA, 1993, 1997). The Learner-Centered Psychological Principles were the result of a three and half year project facilitated by the APA Presidential Task Force on Psychology in Education and McREL (McCombs, 1994). This joint effort was undertaken, in part, to synthesize and integrate the knowledge base from psychology and education about learners and learning relevant to schooling (Alexander & Murphy, 1994; McCombs, 1992; McCombs, 1994).

The principles provided an integrated perspective of factors that influence learning because they were representative of the current knowledge base on learners and learning (APA, 1993, 1997). The joint task force was also motivated to provide a research-based foundation that could better inform decision making about the systemic reforms necessary in instruction, curriculum, assessment, school management, parent and community involvement, and policy that were found deficient or missing (McCombs, 1994). The task force created a document entitled *Learner-Centered Psychological Principles: Guidelines for School Redesign and Reform* (APA, 1993). Coupled with McREL, the group identified 12 basic principles, called the Learner-Centered Psychological Principles (APA, 1993). The APA revised this document in 1997, and it

included 14 principles with the addition of diversity and standards (APA, 1997).

The document contained 14 psychological factors that pertained to the learner and the learning process. These principles focused on the internal constructs under the control of the learner, and attempted to acknowledge external environmental factors that interact with these factors. The 14 principles were holistic and divided into four subsystems: cognitive and metacognitive, motivational and affective, developmental and social, and individual difference factors that influence learners and learning (APA, 1997).

The LCPs encompassed the belief that current reform efforts lacked the profound knowledge and subsequent implementation of teaching and learning strategies based on research from human learning, human motivation, and human development to be effective and sustainable (APA, 1993, 1997; Lambert & McCombs, 1998; Marzano, Pickering, & Pollock, 2001; McCombs 1993, 1994, 1997, 2001; McCombs & Whisler, 1997).

It is necessary, therefore, to look briefly at the development and validation process underlying the identification of the principles. Additionally, it is relevant to examine the four domains and the research base for the LCPs within the context of Level I research identified by Ellis and Fouts (1998).

Development and Validation Process

Each principle was girded with an impressive, exhaustive research base (APA, 1993; 1997; Lambert & McCombs, 1998; McCombs & Whisler, 1997) and focused on the cognitive and metacognitive, motivational and affective, developmental and social, and individual difference factors which were shown by research to have significant impacts on student learning, motivation, and achievement in school (APA, 1993;

Alexander & Murphy, 1994; McCombs, 1994). Research from multiple psychological perspectives was reviewed to identify those higher-level principles or understandings that had emerged from psychological research on learners and learning (McCombs, 1994).

The identified LCPs were subjected to review and critiqued by experts from the field of psychology, notably in the areas of educational, developmental, motivation, social, and cognitive psychology (APA, 1993; McCombs, 1994). Initial drafts of the LCPs were circulated to a wide range of experts in education, including science and mathematics educators, teacher educators, and school counselors (McCombs, 1994). Accordingly, comments and suggestions for revision were incorporated and refinements were made to the document. At least five revisions were undertaken, all of which were based on editorial suggestions, with no substantive issues raised regarding the articulated LCPs (APA, 1997).

In summary, the LCPs were subjected to several careful examinations by a wide range of psychologists, educators, and professionals in various scientific disciplines and subsequently revised to reflect less technical language to encourage a broader application and alignment with its original intent: focus educational reform on the learner and learning (McCombs & Whisler, 1997). To achieve that end, a brief summary of each of the four domains of the LCPs was provided (see Appendix B).

The Four Domains

The domains of the learner-centered psychological principles were divided into four areas, based on the needs of the student. A brief look at each domain describes the psychological needs that must be met for each student.

Cognitive and metacognitive factors. The theory of metacognition was attributed to J. H. Flavell, who coined the term in 1979. A current working definition of

cognition was described as an awareness of knowledge (Morrow, 2003). The first domain of the LCPs contained the first six principles: 1) the nature of the learning process, 2) goals of the learning process, 3) construction of knowledge, 4) strategic thinking, 5) thinking about thinking (metacognition), and 6) context of learning. It was in this domain where habitual formation, goal setting of the learner, transfer of learning, reasoning of complex goals, higher order thinking strategies, and the environmental influences of learning existed. Included are the critical thinking skills acquired by the learner: cultural impacts on learning, appropriate use of technology, and levels of instructional practice relating to prior knowledge (APA, 1997). According to the research in the areas of human learning, memory, and cognition, the learner created, constructed, and linked new information to past and present knowledge in unique and meaningful ways. In summary, research on metacognition, cognitive learning strategies, and higher order thinking strategies provided the theoretical foundation for the first domain (APA, 1993, 1997; Lambert & McCombs, 1998; McCombs & Whisler, 1997).

Motivational and affective factors. The second domain contained principles: 7) characteristics of motivation-enhancing learning tasks, 8) developmental constraints and opportunities, and 9) social and cultural diversity. The principles were related to the motivational and emotional influences on learning. In concert with the first domain, each principle was bolstered with an equally impressive, exhaustive research base (APA, 1993, 1997; Lambert & McCombs, 1998; McCombs & Whisler, 1997).

This subsystem included the psychological and physiological factors that influenced learners, such as emotional state, anxiety, creativity relating to intrinsic motivation, curiosity, and learner effort. Motivation to learn was directly related to the learner's emotional state and willingness to exert effort to become engaged in curiosity

and creativity (APA, 1997). The Task Force studied research underpinning this domain from primarily the areas of social constructivism, adaptive instruction, cultural diversity, self-esteem, socio-emotional support, and personality and social psychology (APA, 1993, 1997; Lambert & McCombs, 1998; McCombs & Whisler, 1997).

In concert, this theory was maintained and directly related to Bloom's affective domain (1956), which included the manner in which people cope with things emotionally, such as feelings, values, appreciation, enthusiasm, motivation, and attitude. There were five tiered-levels in Bloom's Taxonomy (1956), ranging from simple to complex, which the learner had to master before moving up. The top level was what Abraham Maslow referred to as "self-actualization" – a stage in which individuals developed a realistic view of themselves and the world, gained a superior ability to reason and rely on inner self for satisfaction (Maslow, 1943).

Developmental and social factors. The third domain contained principles 10) developmental influences on learning such as age appropriate material and 11) social influences on learning, social acceptance and self-esteem. Research has already shown that individuals learn best when the material presented is appropriate to their developmental level, enjoyable, and interesting. Overemphasis on a learner's developmental readiness could preclude learners from demonstrating that they were more capable to perform. The collaboration and interaction with others on instructional tasks could enhance learning and encourage flexible thinking and social competence in instructional contexts. This allowed for reflective thinking that might lead to higher levels of cognitive, social and moral development, as well as self-esteem. Positive family influences helped learners feel safe to share ideas, actively participate in the learning process, and create a learning community (APA, 1997). In a like manner, Richard

DuFour (2004) established the need for professional learning communities and collaboration that had to impact professional practice in order to improve individual and collective results in achievement. However, Vygotsky believed that social interaction played a fundamental role in the process of cognitive development and that social learning precedes development. Vygotsky (1978) thought that humans use tools that developed from a culture to facilitate their social environments. Vygotsky also emphasized that the internalization of these tools led to higher thinking skills.

Educators all over the world cited Marzano in response to higher thinking skills. Marzano, Brandt, Hughes, Jones, Pressiesen, Rankin, and Suhor (1988) suggested a set of eight "core" thinking skills which were fundamental to cognitive growth and development. They included, focusing, information gathering, remembering, organizing, analyzing, generating, integrating, and evaluating. These higher-order thinking skills were based on Bloom's Taxonomy (1956). Today, Bloom's Revised Taxonomy begins with a hierarchy from the lowest to the highest level of thinking skills: remembering, understanding, applying, analyzing, evaluating, and creating (Anderson & Krathwohl, 2001).

Individual difference factors. The fourth and final level contained principles 12) cognitive filters, 13) learning and diversity, and 14) standards and assessment. "Each unique individual was born with their own capabilities and talents. Learners also developed their own preference for how they like to learn and the pace at which they learn, through social acculturation. The teacher's role was to help the learner examine their learning styles and expand or modify them. Learning was most effective when differences in the learners' linguistic and cultural and social backgrounds were considered. Language, ethnicity, race, beliefs, and socioeconomic status all influenced

learning; therefore, careful attention to these factors in the instructional setting enhanced the development of appropriate learning environments" (APA, 1997, p. 4). Consistent with the previous domains, the Task Force reviewed the research supporting the fifth domain (APA, 1993, 1997; Lambert & McCombs, 1998; McCombs & Whisler, 1997). Huba and Freed (2000) used the phrase "learning-centered assessment" to emphasize transition in the focus of instruction and assessment from teaching to learning. The researchers explained that learner-centered assessment entails both teacher and student actively learning together.

Setting challenging and appropriate standards for assessing the learner was an integral part of the learning process that enhanced motivation and self-directed learning (APA, 1997). The NCTM (2011) suggested that standards describe what students know and could do. "The Content Standards—Number and Operations, Algebra, Geometry, Measurement, and Data Analysis and Probability—explicitly described the content that students should learn. The Process Standards—Problem Solving, Reasoning and Proof, Communication, Connections, and Representation—highlighted ways of acquiring and using content knowledge" (NCTM, 1989, p. 6).

In summary, the theoretical underpinnings of each domain and the LCPs contained therein attended to cognitive, motivational, social, and emotional dimensions of learning. Based on the research-validated LCPs (APA 1993, 1997), the four domains suggested a balanced, albeit focused, holistic emphasis on the learner and the learning process (Lambert & McCombs, 1998). Yet, this emphasis on the learner and learning process as represented by the domains was theoretical without providing a foundation for the empirical investigation of instructional and assessment practices.

Definition of Learner-Centered

Learner-centered means that everything that occurs in the classroom is tailored to meet the needs of the learner or student. Learner-centered instruction is an approach that requires students to have an active role in their learning processes. Collins and O'Brien (2003) defined student-centered instruction [SCI] as "an instructional approach in which students influenced the content, activities, materials, and pace of learning. This learning model placed the student (learner) in the center of the learning process. The instructor provided students with opportunities to learn independently and from one another and coached them in the skills they needed to do so effectively" (p. 401).

From 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 coupled a focus on individual learners—their heredity, experiences, perspectives, backgrounds, 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. 9).

McCombs (2001) refined the above definition of learner-centered into a more practical, working definition specifying both behaviors and practices of learner-centeredness. She wrote:

> Learner-centered reflects the learner-centered principles in the programs practices, policies, and people that support learning for all learners in the system. Learner-centered balances the concern with learning and achievement and the concern with diverse learner needs. Learner-centered is a complex interaction of

> qualities of the teacher in combination with characteristics of instructional practices – as perceived by individual learners. Learner-centered meaningfully predicts learner motivation and levels of learning and achievement (p. 22).

In both definitions, there were premises or hypotheses formed concerning the learner and the learning process. McCombs and Whisler (1997) built on the emergent research on learner-centered principles, and expanded the aforementioned definitions of learner-centered through the identification of five premises.

Premises of Learner-Centered Learning

McCombs and Whisler (1997), motivated in part to understand the shortcomings of failed educational reform initiatives, undertook the task of expanding the implications of the learner-centered principles to the broader context of classrooms and schools. McCombs and Whisler (1997) condensed the learner-centered principles to five premises.

1. Learners are distinct and unique. Their distinctiveness and uniqueness have to be attended to and taken into account if learners are to engage in and take responsibility 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 nonacademic attributes and needs. These have to be taken into account if all learners are to be provided with the necessary challenges and opportunities for learning and self-development.
3. Learning is a constructive process that occurs best when what is being learned is relevant and meaningful to the learner and when the learner is actively engaged in creating his or her own knowledge and understanding by connecting what is being learned with prior knowledge and experience.

4. Learning occurs best in a positive environment, one that contains positive interpersonal relationships and interactions, that contains comfort and order, and in which the learner feels appreciated, acknowledged, respected, and validated.

5. Learning is a fundamental natural process; learners are naturally curious and basically interested in learning about and mastering their world. Although negative thoughts and feelings sometimes interfere with their natural inclination and have to be dealt with, the learner does not require "fixing" (McCombs & Whisler, 1997, p. 10).

"These five premises are the foundational framework of the learner-centered principles" (McCombs & Whisler, 1997, p. 10). Akin to these premises were a body of research and a comparable set of attributes emergent from the school effects research (Lezotte, 1997). Though they reached similar conclusions, a distinctive difference between McCombs and Whisler's (1997) premises and Lezotte's (1997) school effects research was the empirical research base derived from the psychological principles of human learning, motivation, and development. However, the school effects research of Brookover and Lezotte (1977) and Edmonds and Frederiksen (1975) were in fact driven by deeply held beliefs about learning, the learner, and the role of the teacher and school that are relevant to the learner-centered principles.

The school effects research was replete with studies that supported the finding that teachers with high expectations for student achievement do, in fact, significantly influence student achievement (Lezotte, 1997). This is explored in greater detail in the Level II research section.

McCombs and Whisler's research (1997) differed from the aforementioned school effects research in the depth and extent to which the learner-centered principles resulted

from myriad psychological perspectives emergent from the psychological research specific to learners and learning (APA, 1993; Lambert & McCombs, 1998; McCombs, 1994; McCombs & Whisler, 1997).

Fittingly, Level I research of the learner-centered principles was foundational to "theory building to empirical research albeit quantitative or qualitative" (Ellis & Fouts, 1998, p. 8) that is the basis for the Level II research section. First, however, a brief summary of Level I research is presented.

Summary of the Learner-Centered Psychological Principles

The 14 psychological principles were categorized within four domains or constructs identified as 1) cognitive and metacognitive, 2) motivational and affective, 3) developmental and social, and 4) individual difference factors influencing learners and learning (APA, 1993, 1997) (see Appendix E).

The formation of Level I research was comprised of two volumes of research. The first was a 3-year study commissioned by the American Psychological Association Presidential Task Force on Psychology in Education and Mid-continent Regional Educational Laboratory that included an exhaustive review of literature (McCombs, 1994). The second volume of research came at the request of the American Psychological Association's Board of Educational Affairs that included a further study of literature and related research of the psychological principles of human learning, motivation, and development (Lambert & McCombs, 1998).

The resulting LCPs definition of the term "learner-centered" and the learner-centered premises provided a theoretical concept of holistic learning through an intentional focus on the learner accounting for the interaction between psychological factors with external environment or contextual factors (APA, 1993, 1997). This

theoretical concept, however, was limited in its utility for influencing educational reform without, as Ellis and Fouts (1998) suggested, "research [that] provided practical insights … [not] derived directly from pure research" (p. 27).

Therefore, the Level II research section is constructed 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 (1998) defined Level II research as involving "studies designed to test the efficacy of particular programs or instructional methods in educational settings" (p. 27). To that end, Ellis and Fouts (1998) identified at least two parameters or criteria that Level II research must meet. They were: 1) "it is conducted in the same or similar settings that are actually found in schools and 2) it makes no attempt to develop a theory, but rather attempts to make instructional or curricular applications of a given theory" (p. 27). Finally, Ellis and Fouts (1998) summarized the outcome of Level II research as providing "practical insights that cannot be derived directly from pure research" (p. 22).

In concert with the framework described by Ellis and Fouts (1998), this review of Level II research section is organized into four components: 1) The validation and initial findings of the learner-centered battery, 2) research conducted on domains of the learner-centered principles, 3) studies that directly and indirectly explored the association of learner-centered practices and behaviors of teachers on the academic achievement of students, and 4) Summary of Level II research.

Validation and Initial Findings of the Learner-Centered Battery

As a direct outgrowth of their work with the learner-centered psychological

principles (APA, 1993), researchers at McREL identified a need to develop an instrument that would assist educators in addressing three purposes reflective of the learner-centered principles. McCombs & Lauer (1997) reported:

> The [Learner-Centered] Battery's (LCB) purpose was to address the need for teachers to (a) examine the consistency of their basic beliefs and assumptions about learners, learning, and teaching with the current knowledge base; (b) attend to student perceptions of their classroom practices in domains critical to motivation, learning, and achievement; and (c) use self-assessment and reflection skills to identify areas of needed professional development in order to meet the needs of all students (p. 1).

The Learner-Centered Battery was constructed utilizing a two-phase validation process that included (a) the establishment of both reliability and content validity and (b) the establishment of construct and predictive validity (McCombs & Lauer, 1997). Critical to each phase of the initial validation was the accuracy of the Learner-Centered Battery as, in part, a measure of student motivation and achievement (McCombs & Lauer, 1997).

Lauer, McCombs, and Pierce (1998) and McCombs (1999) built upon the validation research of the LCB through the development and testing of the Assessment of Learner-Centered Practices (ALCP). The ALCP included an exact version of the original LCB instrument (McCombs, 1999).

A more thorough examination of the psychometric protocols and statistical analysis of the LCB and ALCP are included in Chapter 3 of this study. Let it suffice here to say that an exhaustive process of item development and pilot testing culminated in an instrument being validated with large samples of elementary, middle, and high school students and teachers from diverse geographic regions of the United States (Lauer, et al.,

1998; McCombs, 1999; McCombs & Lauer, 1997).

Of particular relevance to this present study and the review of Level II research were the results of the second phase of validation conducted by researchers at McREL. As reported by McCombs and Lauer (1997), six validation hypotheses formed from the initial review of research literature as best predictors of student motivation and student achievement. In testing each hypothesis, the researchers concluded that, "Students' perceptions of their teachers' learner-centered practices were good predictors of their academic motivation" (McCombs & Lauer, 1997, p. 15).

Of equal importance were the researchers' conclusions. "The exploratory results showed that teachers' characteristics influenced their learner-centered beliefs, which influenced students' perceptions of teacher practice, and these perceptions, in turn, influenced students' motivation and, finally, classroom achievement" (McCombs & Lauer, 1997, p. 15). To ascertain academic motivation and student achievement, teachers were asked to record a classroom-based grade for each student. The student grade was correlated with the level of learner-centeredness by the teacher emergent from the LCB (McCombs & Lauer, 1997).

Fasko and Grubb (1997) conducted a study in the state of Kentucky using the LCB with three defined purposes. The researchers determined to 1) assess experienced teachers' beliefs about and use of learner-centered practices, 2) investigate the relationship of student responses on the LCB to student motivation and achievement, and their teachers' teaching practices, and 3) evaluate the usefulness of the LCB for teacher education reform (Fasko & Grubb, 1997).

Fasko and Grubb's (1997) findings were consistent with those results reported by

McCombs and Lauer (1997). Two distinctions stand out, however. Fasko and Grubb (1997) reported that effective teachers, as measured by improvement in student grades and student perceptions, demonstrated a greater degree of implementation of learner-centered domains of practice than did less effective teachers.

In a similar study by Fasko, Grubb, Jesse, and McCombs (1997), researchers replicated the previous study of the learner-centered education on the academic outcomes of elementary minority students using the ALCP surveys for teachers. Once again, the results showed that students in high learner-centered environments scored statistically equal to their counterparts on standardized assessments and higher on non-traditional criteria.

In Weinberger and McCombs' (2001) study of upper elementary and middle school students, the researchers found similar results to those of Fasko and Grubb (1997). Weinberger and McCombs (2001) found academic performance as well as non-academic outcomes improved in classrooms where teachers exhibited a higher degree of learner-centered practices over non-learner-centered practices (Weinberger & McCombs, 2001). To determine improvement in academic achievement, the researchers compared both teacher-classroom grades and standardized achievement tests along with the results of the LCB.

In a like manner, similar results prevailed when Weinberger and McCombs (2003) applied the LCPs to high schools using the ALCP surveys. Teachers revealed that the self-assessment and reflection helped to identify areas of deficiency that helped them change their practices to be more effective in reaching more students. When high school teachers became more learner-centered in their beliefs and practices, the gap between teacher and student perceptions decreased. For high school students, learner-centered

teaching and new learning partnerships created a key for meeting student needs within the current educational agenda (Weinberger & McCombs, 2003).

A second distinction identified by Fasko and Grubb (1997) was one that expanded the original purpose of the LCB. That is, the reliability of the LCB identifying effective from less effective teachers was measured by the correlation of teacher assigned grades with the results of the LCB (Fasko & Grubb, 1997). Similarly, in using the ALCP, Weinberger and McCombs (2001) concluded that being "learner-centered" was "related to the beliefs, characteristics, dispositions, and practices of teachers – practices primarily created by the teacher" (p. 8).

Accordingly, McCombs (1999) concluded that teacher and school practices emergent from the learner-centered principles focused on the needs of all learners based on a deep understanding of teaching and the learning process (McCombs & Whisler, 1997; Weinberger & McCombs, 2001). Thus, learner-centered practices focused on the knowledge base as well as research on both learners and learning, based on the implementation of effective strategies. This also resulted in higher academic achievement as measured by student classroom grades (Weinberger & McCombs, 2001).

The distinction between effective and less effective teachers found by Fasko and Grubb (1997) was accentuated in the research examining one or more of the correlates of effective schools (Lezotte, 1997). Though formed from a separate body of research and for different purposes, the correlates of effective schools (Lezotte, 1997) reflected an integrated and holistic expression of learner-centered practices at Level II research.

For example, the initial effective schools research of Weber (1971), the State of New York's Office of Education Performance Review (1974), Edmonds and Frederiksen (1975), Madden, Lawson and Sweet (1976), and Brookover and Lezotte (1977) identified

several common, defining characteristics of effective schools. It was found that when instruction, curriculum, and assessment were modified and adjusted to the uniqueness of students in a safe and orderly climate of high expectation of learning, effective student motivation and student achievement was evident (Edmonds, 1979).

The initial correlates or attributes of effective schools summarized by Edmonds (1979) included the following characteristics: 1) schools could make a difference for all students regardless of the students' race, gender, or home and family background, 2) staffs in effective schools were perceived to be more accountable, accepted responsibility for student progress, and took achievement seriously with a nonsense, aggressive, and shared approach toward achieving instructional goals, and 3) frequent monitoring and adjusting of inputs to assure individual pupil progress on essential skills, based upon a variety of data, was common in effective schools (Edmonds, 1979).

Yet, measuring the direct impact or influence of the correlates of effective schools on improving learning and student achievement has been problematic. "The selection of criteria for classifying a school or schools as effective or ineffective had been a topic of considerable debate and research" (Levine & Lezotte, 1990, p. 4). Differing achievement criteria that included classroom-based grades, norm-referenced assessment results, criterion-referenced assessment results, or performance-based assessment results has been used in determining school effectiveness (Levine & Lezotte, 1990). The key, however, had been the disaggregation of the data according to student, teacher, and school demographic information.

Nonetheless, the correlates of school effectiveness were just that, (Levine & Lezotte, 1990) as they did not establish cause and effect relationships. Despite this limitation, the initial school effects research and resulting correlates (see Appendix F)

were grounded with a belief and focus on learner-centered learning (Lezotte, 2000). Level II research, including several studies of the correlates of effective schools, is therefore critical to examine the efficacy of the learner-centered principles.

Correlates of Effective Schools

As reported in the Level I research review, the theoretical underpinnings and subsequent constructs or domains identified from the 14 learner-centered psychological principles were anchored with a solid research base (APA 1993, 1997).

In a like manner, the research base for the correlates of effective schools was expansive and comprehensive (Cotton, 1995; Lezotte, 1997, 2000; Sammons, Hillman, & Mortimore, 1995). This section, therefore, consists of a review of several studies conducted to investigate specifically the role of teacher beliefs and their impact on student motivation and student achievement consistent with the definition of Level II research by Ellis and Fouts (1998) found in the school effects research. The results of these studies pointed to the power of teacher expectations and their influence on student motivation and achievement. Underpinning teacher expectations was a base or foundation of beliefs about the learner, learning process, the role of the teacher, parent, school, and the purpose of education (Lezotte & Jacoby, 1992).

In addition to the correlates, research on reform from the National Council of Teachers of Mathematics (NCTM) had defined mathematics as a form of reasoning in a logical manner, making sense of things, and justifying judgments and conclusions. Battista (1999) suggested that mathematical behavior was demonstrated when patterns were recognized and described, physical and conceptual models of phenomena were constructed, and systems were created to help represent, manipulate and reflect on ideas and procedures to solve problems.

Edmonds (1979) studied the differences between high-achieving or effective schools and those that were considered low-achieving or less effective. He found the following characteristics of effective schools: 1) teachers believed all their students could learn, 2) teachers had specific goals, 3) teachers were not satisfied with the status quo, 4) teachers had more supportive principals, 5) the principal was a strong leader, visible and supportive, 6) there was more student monitoring, 7) teachers had high expectations for their students, 8) students were happier and worked harder, and 9) there was trust between students, faculty and staff (Edmonds, 1979; Edmonds & Fredricksen, 1975).

Follow-up research conducted in subsequent years reaffirmed these findings and the fact that these characteristics describe elementary and secondary schools where children do learn at a significantly high level (Lezotte, 1997). Replication studies had been conducted in all types of schools: suburban, rural, urban, high schools, middle schools, elementary schools, high socioeconomic communities, middle class communities, and low socioeconomic communities (Bullard & Taylor, 1993; Cawelti, 1995).

Similarly, comprehensive research conducted by Romberg (2000) revealed that meaningful mathematics learning is a product of purposeful engagement and interaction that builds on prior experience.

Raudenbush, Rowan, and Cheong (1993) investigated the sharp contrast between current visions of educational excellence and current patterns of educational practice. Their results revealed that student motivation and achievement were unambiguously linked to teacher expectations. The researchers concluded that teacher expectations were driven by a set of uncompromising beliefs about the learner and learning (Raudenbush et al., 1993).

Carter (2000), using a case-study research design, profiled twenty-one high-performing schools consisting of high-poverty students. He identified several common traits and practices. These traits were teacher quality, instructional diversity, high expectations for staff and student learning, rigorous and regular assessment, and a safe and orderly learning environment (Carter, 2000). Consistent with the learner-centered principles, the participants in the case studies voiced a strongly held set of beliefs that directed and anchored their work. Chief among these beliefs was an unwavering commitment to personalizing learning for each learner regardless of race or poverty (Carter, 2000).

An article on the essential characteristics of an effective standards-based mathematics classroom concluded that student-centered learning activities had to be the central focus of the environment (Teaching Today, 2005).

In a like manner, Goddard, Sweetland, and Hoy (2000) investigated the relationship of student learning and achievement with the educational climate. Strikingly, the researchers concluded that an academic or learning emphasis influenced both personal and organizational behavior that fostered learning success (Goddard et al., 2000). They found when improvements occurred as a result of an emphasis on learning, the learning emphasis of the school was, in turn, strengthened. A strong learning emphasis in the climate of a school not only improved student achievement and teacher performance, it also influenced the beliefs held by the school's staff (Goddard et al., 2000).

Similarly, Wigfield, Eccles, and Rodriguez (1998) investigated the nature of student motivation and the effects of the social organization of classrooms on student motivation and achievement. Wigfield et al.'s (1998) findings, consistent with previous

studies, found the relationship between students and teachers with a positive classroom climate to have a significant impact on student motivation and achievement.

Crevola and Hill (1998) investigated prevention and intervention in early literacy. They found in strategies that yielded significant differences in pre and post-test results, "a belief in the capacity of all students to make progress" (p. 135) was a common theme.

Lee and Smith (1996) studied the relationship between the level of teacher responsibility and student achievement. The results of this study were quite dramatic and clearly showed the influence of teachers over the academic achievement of students both positively as well as negatively (Lee & Smith, 1996; Weinstein, Madison, & Kuklinski, 1995). Lee and Smith's (1996) study demonstrated that "schools where most teachers take responsibility for learning are environments that are both more effective and more equitable" (p. 130). Specifically, teacher attitudes affected students in a direct way. "Our findings suggest that trying to change how teachers work in schools can influence how students learn" (Lee and Smith, 1996, p. 132).

Good and Brophy (1991) examined the role of teacher expectations and the inferences that teachers make about the academic achievement or future behavior of students, based on what they know about these students. Good and Brophy (1991) presented several conclusions about teacher expectations. They summarized how teachers' behaviors were shaped by expectations and by teacher beliefs about student learning ability, prior student learning experiences, student learning needs, and the students response or reaction to teacher behavior. Additionally, Good and Brophy (1991) found that teacher expectation effects on student achievement were greater in lower grades, whenever students were new to a school, early in the school year, in reading rather than math, in classrooms that emphasize consistent goals, a narrow range of

activities, use norm referenced tests, had a competitive atmosphere, and made public student performance results.

The results of a study by Fuchs, Fuchs, and Phillips (1994) supported the findings of previous studies regarding the importance of the relationship between teacher expectations and student achievement (Carter, 2000; Crevola & Hill, 1998; Goddard et al., 2000; Lee and Smith, 1996; Raudenbush et al., 1993; Wigfield et al., 1998). The researchers found teachers who perceived themselves to have higher standards regarding student work habits and who perceived themselves to exhibit effective teacher behaviors were more responsive to individual student needs (Fuchs et al., 1994). Additionally, teachers who were more responsive to individual student needs considered the needs of students in instructional planning resulted in greater achievement as measured by improvement of classroom grades in reading and math (Fuchs et al., 1994).

Delclos, Burns, and Kulewicz (1987) found student motivation and achievement positively influenced by teacher expectations. In their study of the effects of assessment on teacher expectations of handicapped children, the researchers found student achievement was affected by the following: high expectations for student achievement commonly held by teachers, administrators, parents, and by students themselves; positive student-teacher interactions which included immediate feedback on performance; and the common belief that all students could learn and that all teachers could teach.

Though it is largely beyond the scope and purpose of this study to examine the school effects research, the relationship of teacher expectations with student motivation and achievement are inexplicably linked to learner-centered beliefs (Carter, 2000; Crevola & Hill, 1998; Goddard, Sweetland, & Hoy, 2000; Lee & Smith, 1996; Raudenbush, et al., 1993; Wigfield et al., 1998;). The heart of the effective schools

philosophy stated that there needed to be a strong belief by all school personnel that all children could learn. This belief was played out in the treatment students receive in their day-to-day educational experiences (Lezotte & Pepperl, 1999).

Though not intentional in studying the theoretical constructs of the learner-centered beliefs, the school effects research validated and affirmed the practices emergent from the classroom and school application of the 14 learner-centered psychological principles (APA, 1993; 1997). The belief that all students can learn is critical to school effectiveness (Lezotte, 2000). The Level II research section suggested that schools that were becoming more effective as measured by increased student achievement and motivation were driven in part or in whole by learner-centered beliefs and practices.

To further investigate and assess the impact or implementation of learner-centered beliefs and practices at the school or school district level, a review of the third level of research is presented. To this end, the Level III research section is presented to review the effectiveness of the learner-centered principles and their impact on a larger scale.

Level III Research

Ellis and Fouts (1998) defined Level III research as "evaluation research designed to determine the efficacy of programs at the level of school or district implementation" (p. 28). Given that the "learner-centered beliefs and practices" was not a formal program or even a unified reform effort, Level III research includes evaluative studies that examine the overall effects on teachers and students was problematic.

The review of Level II research includes limited studies conducted specifically to examine the relationship of student achievement and motivation with the learner-centered principles (Fasko and Grubb, 1997; Lauer et al., 1998; McCombs, 1999, 2001; McCombs & Lauer, 1997; Weinberger & McCombs, 2001). Additionally, a limited number of

studies that assessed [in whole or in part] the application of the theoretical construct and learner-centered practices affecting student achievement and motivation were reviewed (Carter, 2000; Crevola & Hill, 1998; Delclos et al., 1987; Fuchs et al., 1994; Goddard et al., 2000; Lee & Smith, 1996; Raudenbush et al., 1993; Wigfield et al., 1998).

The Level III research section, however, could not employ the approach or technique of looking at individual principles, as was the case in the Level II research section. Simply, the inclusion of studies that did not evaluate the learner-centered principles as a whole could not serve as an accurate assessment of the effects of the large-scale implementation. Therefore, Level III research did not presently exist in a form that could inform this present study.

Despite this deficiency, Level I and Level II research results accompanied by studies assessing restructuring and whole school reform in the state of Washington by Fouts, Olson and Viadero. These researchers provided a snapshot of the utility of the learner-centered principles consistent with Ellis and Fouts' (1998) description of Level III research. However, no similar studies had been conducted in North Carolina. Moreover, North Carolina's response to a call for a comprehensive school reform effort in 2001 consisted of $50-$75,000 grants funded by the North Carolina Department of Public Instruction (NCDPI) based on one of the thirty-four whole-school models found in the Northwest Laboratory's Catalog of School Reform Models (NCDPI, 2011). Nonetheless, the long-term implications as well as the overall usefulness of the learner-centered beliefs and practice as they pertained to sustainable, enduring change remained untested.

Consequently, a daunting gap existed in the literature about the efficacy as well as durability of the learner-centered beliefs and practices if it was to be the basis of a reform

model. Therefore, questions remained about the measurable, quantifiable relationship between student achievement and teachers and the school's level of learner-centered beliefs and accompanying practices. Furthermore, questions about the measurable, quantifiable differences in student achievement based on the level of learner-centeredness of a teacher or school had not been answered in the literature. Finally, questions about learner-centered beliefs and practices had yet to be correlated with student achievement as measured by the North Carolina End-of-Grade Assessment.

Chapter 3: Methodology

Overview

The present study employed a non-experimental, quantitative design that examined the relationship between the learner-centered beliefs of seventh grade mathematics teachers and the performance of their students on the mathematics section of the North Carolina End-of-Grade (EOG) Assessment.

Participants

A sample of 90 (N = 90) mathematics teachers, from 19 (N = 19) middle schools in the Piedmont-Triad and neighboring counties in North Carolina, assigned to teach seventh grade mathematics in the 2010-2011 school year were asked to complete the Teacher Beliefs Survey via email. Thirty-three (N = 33) or 37% of the teachers completed the survey. Students who were enrolled in seventh grade mathematics classes during the 2010-2011 school year and who were administered the spring 2011 End-of-Grade Mathematics section of the North Carolina Assessment were included in the study. Based on school data, provided by North Carolina Department of Public Instruction (NCDPI), mathematics teachers' participation was obtained from a stratified geographical sample from the Piedmont-Triad and neighboring counties of North Carolina's public school systems. Seventh grade mathematics teachers from 19 (N = 19) schools participated in this present study. Similarly, students who were enrolled in the aforementioned school systems were selected based on the seventh grade mathematics teachers participating in the study.

Apparatus

The Teacher Beliefs Survey (TBS) developed by McCombs (1999), contained 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 the 35 items divided into three subscales: (1) Learner-Centered Beliefs about Learners, Learning, and Teaching (14 items, alpha= .87), (2) Non-learner-Centered Beliefs About Learners (9 items, alpha= .83), and (3) Non-learner-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 construct validity of the Teacher Survey (McCombs & Lauer, 1994). Therefore, the TBS had demonstrated both internal consistency and construct validity critical for use in this study.

In addition to the TBS (McCombs & Lauer, 1994) was a set of demographic questions such as years of mathematics teaching experience, area of academic preparation, level of education attained, and optional questions such as gender, ethnicity, and age.

Procedure

Participant selection. Data from NCDPI was requested about the performance data from 19 (N = 19) middle schools in a certain area and neighboring counties of North Carolina. A sample of 90 (N = 90) mathematics teachers assigned to teach seventh grade mathematics in 2010-2011 was identified from the requested data.

An electronic cover letter requesting participation in the Teacher Beliefs Survey (McCombs and Lauer, 1994) and explaining the purpose of the study was sent to seventh grade mathematics teachers in this area and neighboring school systems in North Carolina (see Appendix G).

Administration of surveys. The researcher created a web-based survey site

where participants could take the survey at their convenience.

Data Analysis

The 35-item Teacher Beliefs Survey generated Likert-scale data, which was stored and analyzed in a Statistical Package for Social Sciences (Green, Salkind, and Akey, 2000) (see Appendix H). Differences in survey responses of teachers and the learner-centered beliefs of teachers using: 1) a T-test for simple differences and 2) an Analysis of Variance (ANOVA) to compare the differences within and between two or more means were analyzed. Descriptive statistics including means and standard deviation are reported, as well as the Pearson Product Moment Correlational Coefficient to determine if, and to what extent, the relationship between one or more variables existed.

Chapter 4: Results

The results of this present study are presented in four sections. Each section addresses the research questions and hypotheses. The first section provides a summary of the background information and demographics of seventh grade mathematics teachers who participated. The second section reviews the results of the four hypotheses, based on the data. The third section looks at all six research questions, the statistical analysis and the actual results. Finally, the fourth section provides a summary of results, recommendations and a conclusion.

Demographic Information

Survey requests were sent out to seventh grade mathematics teachers from 90 (N = 90) middle schools in the Piedmont-Triad and neighboring areas of North Carolina. Thirty-three (N = 33) or 37% of the surveys were completed and returned. Demographic data was compiled in three areas: 1) years teaching, 2) area of teaching preparation, and 3) highest degree earned.

Total Years of Teaching. Six teachers (n = 6) or 18.2% were in their first through fourth year of teaching (see Table 1). Nine teachers (n = 9) or 27.3% ranged from 5 through 9 years total teaching experience. Six teachers (n = 6) or 18.2% had 10 through 15 years of total teaching experience. Fifteen and two-tenths percent or five (n = 5) ranged from 16 to 23 years of total teaching experience. Finally, seven (n = 7) or 21.2% had more than 24 years of total teaching experience.

Table 1

Total Years of Teaching

	Frequency	*Percent*	*Valid Percent*	*Cumulative Percent*
A 1-4	6	18.2	18.2	18.2
B 5-9	9	27.3	27.3	45.5
C 10-15	6	18.2	18.2	63.6
D 16-23	5	15.2	15.2	78.8
E 24+	7	21.2	21.2	100.0
Total	33	100.0	100.0	

Total Years of Teaching Mathematics. Eight teachers (n = 8) or 26.7% were in their first through fourth year of teaching mathematics (see Table 2). Six (n = 6) or 20% ranged from 5 to 9 years of teaching mathematics. Nine (n = 9) or 30% had ten to fifteen years of teaching mathematics. Thirteen and three-tenths percent or four (n = 4) ranged from 16 to 23 years of teaching mathematics. Finally, three (n = 3) or 10% had 24 years or more of teaching mathematics.

Table 2

Total Years of Teaching Mathematics

	Frequency	*Percent*	*Valid Percent*	*Cumulative Percent*
A 1-4	8	26.7	26.7	26.7
B 5-9	6	20.0	20.0	46.7
C 10-15	9	30.0	30.0	76.7
D 16-23	4	13.3	13.3	90.0
E 24+	3	10.0	10.0	100.0
Total	30	100.0	100.0	

Total Years of Teaching Middle School Mathematics. Ten teachers (n = 10) or 33.3% were in their first through fourth year of teaching mathematics at the middle school level (see Table 3). Five (n = 5) or 16.7% ranged from 5 to 9 years of teaching middle school mathematics. Nine (n = 9) or 30% had 10 to 15 years of teaching middle school mathematics. Ten percent or three (n = 3) ranged from 16 to 23 years of teaching middle school mathematics. Finally, three (n = 3) or 10% had 24 years or more of teaching middle school mathematics.

Table 3

Total Years Teaching Middle School Mathematics

	Frequency	*Percent*	*Valid Percent*	*Cumulative Percent*
A 1-4	10	33.3	33.3	33.3
B 5-9	5	16.7	16.7	50.0
C 10-15	9	30.0	30.0	80.0
D 16-23	3	10.0	10.0	90.0
E 24+	3	10.0	10.0	100.0
Total	30	100.0	100.0	

Major Area of Teaching Preparation. As presented in Table 4, twenty-five teachers (n = 25) or 75.8% indicated that mathematics was their major area of teacher preparation. Two teachers (n = 2) or 6.1% reported that science was their major area of teacher preparation. Zero (n = 0) 0% indicated that Language Arts was their major area of teacher preparation. One teacher (n = 1) or 3% indicated that social studies was their major area of teacher preparation. Finally, five (n = 5) or 15.2% identified "other" as their major area of teacher preparation.

Table 4

Major Area of Teaching Preparation

	Frequency	*Percent*	*Valid Percent*	*Cumulative Percent*
A Mathematics	25	75.8	75.8	75.8
B Science	2	6.1	6.1	81.8
C Language Arts	0	0.0	0.0	00.0
D Social Studies	1	3.0	3.0	84.8
E Other	5	15.2	15.2	100.0
Total	33	100.0	100.0	

Minor area of Teaching Preparation. Eight teachers (n = 8) or 24.2% indicated that mathematics was their minor area of teacher preparation (see Table 5). Seven (n = 7) or 21.7% identified science as their minor area of teacher preparation. Five (n = 5) or 15.2% identified language arts as their minor area of teacher preparation. Nine and one-tenth percent or three (n = 3) identified social studies as their minor area of teacher preparation. Finally, 11 (n = 11) or 33.3% identified "other" as their minor area of teacher preparation.

Table 5

Minor Area of Teaching Preparation

	Frequency	*Percent*	*Valid Percent*	*Cumulative Percent*
A Mathematics	8	24.2	24.2	24.2
B Science	7	21.7	21.7	21.2
C Language Arts	5	15.2	15.2	15.2
D Social Studies	3	9.1	9.1	9.1
E Other	11	33.3	33.3	33.3
Total	33	100.0	100.0	

Highest Degree Earned. Fifteen teachers (n = 15) or 50% indicated their highest degree was either a Bachelor of Arts or Bachelor of Science (see Table 6). Fourteen (n = 14) or 46.7% indicated their highest degree earned was either a Masters of Art or a Masters of Science. Finally, three and three-tenths percent or one (n = 1) indicated they have earned a doctorate.

Table 6

Highest Degree Earned

	Frequency	*Percent*	*Valid Percent*	*Cumulative Percent*
A BA/BS	15	45.5	45.5	45.5
B MA/MS	17	51.5	51.5	97.0
C EdD/PhD	1	3.0	3.0	100.0
Total	33	100.0	100.0	

Four Hypotheses

Hypothesis 1. Students who met (Level III) or exceeded (Level IV) state standards on the mathematics section of the North Carolina End-of-Grade (EOG) Assessment were taught by teachers who use learner-centered practices and have high learner-centered beliefs.

Hypothesis 2. Students who did not meet (Level III) state standards on the mathematics section of the North Carolina EOG Assessment were taught by teachers who do not use learner-centered practices and have non-learner-centered beliefs.

Hypothesis 3. There is a higher correlation between student performance on the seventh grade mathematics section of the North Carolina EOG Assessment and teachers with learner-centered beliefs.

Hypothesis 4. There is a higher inverse correlation between student performance on the seventh grade mathematics section of the North Carolina EOG Assessment and 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 of seventh grade mathematics teachers?

McCombs and Whisler (1997) identified statistical measures of $\underline{M} > 3.4$ for teachers with Learner-Centered Beliefs, $\underline{M} < 2.0$ for teachers with Non-Learner-Centered Beliefs about Learners, and $\underline{M} < 2.0$ for teachers with Non-Learner-Centered Beliefs about Teaching and Learning. Teachers with $\underline{M} < 2.8$ for Learner-Centered Beliefs, $\underline{M} > 2.4$ for Non-Learner-Centered Beliefs about Learners, and $\underline{M} > 2.4$ for Non-Learner-Centered Beliefs about Teaching and Learning were identified as teachers with non-

learner-centered beliefs. Table 7 shows research question 1 results using these means.

Table 7

Learner-Centered Beliefs Means

	LCB	*NLCB (Learners)*	*NLCB (Teaching & Learning)*
Teachers	*M*	*M*	*M*
Forbush Middle1	2.86	2.11	3.25
Starmount1	3.36	2.89	2.33
Forbush Middle2	3.29	2.56	2.83
East Forsythe	2.57	3.22	2.75
Flat Rock	2.64	3.22	2.58
Kernersville	2.93	2.56	2.25
Ferndale Middle	3.50	2.11	3.08
Clemmons Middle	3.43	2.33	2.33
Hill Middle	3.57	2.33	2.33
Forbush Middle3	2.93	2.11	2.58
Starmount2	3.57	2.44	2.50
Knox Middle1	3.86	1.44	2.33
CC Erwin1	3.21	2.78	2.67
CC Erwin2	2.50	3.00	3.25
Hickory Ridge1	3.29	2.67	1.75
Harris Road1	3.57	1.44	1.00
CC Griffin1	2.79	3.00	2.33
Hickory Ridge2	3.43	1.78	1.92
Concord Middle1	2.79	2.22	2.25
CC Erwin3	3.29	2.56	2.17
Concord Middle2	3.07	2.44	2.92
Corriher Lipe1	2.86	1.89	2.25
CC Griffin2	2.64	3.67	3.75
Southeast Middle	3.43	2.78	3.67
Harris Road2	4.00	2.44	3.42
Concord Middle3	2.07	3.67	3.75
China Grove Middle	3.93	3.00	3.58
J N Fries Middle	3.71	2.44	2.92
Hickory Ridge3	2.86	3.67	4.00
Mt Pleasant Middle	3.43	1.89	1.83
Corriher Lipe2	3.21	3.33	2.58
Concord Middle4	3.07	3.00	2.50
Knox Middle2	3.07	2.56	3.33

Standard deviations for each factor were .40, .56, and .49, respectively (McCombs and Whisler,1997). The results of this present study showed that the standard deviations for each factor were .44, .59, and .67, respectively (see Table 8).

Table 8

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

	N	M	SD
LCB	33	3.2	.44295
NLCBL	33	2.6	.58682
NLCBTL	33	2.7	.66721

Twenty-five teachers (n = 25) did not meet the aforementioned McCombs and Whisler (1997) statistical definition of a learner-centered teacher or non-learner-centered teacher. Five (n = 5) teachers met the criteria for non-learner-centered beliefs. Three (n = 3) teachers from proficient schools, (see Table 9), met the criteria for learner-centered beliefs.

Table 9

Learner-Centered Teachers

Teacher	*M > 3.4*	*M < 2.0*	*M < 2.0*
Harris Road1	3.6	1.4	1.0
Hickory Ridge2	3.4	1.8	1.9
Mt. Pleasant	3.4	1.8	1.8

As noted, only three teachers (n = 3) met the McCombs and Whisler (1997) statistical definition of a learner-centered teacher. However, upon a more careful

examination, nine (n = 9) teachers met or exceeded the validation mean of $\underline{M} > 3.4$ for the learner-centered beliefs about the learner, teaching, and learning (see Table 10). Conversely, five (n = 5) teachers from participating schools met the criteria for non-learner-centered beliefs (see Table 11).

Table 10

Teachers Above the Validation Mean for Learner-Centered Beliefs

	LCB
Teacher	*M > 3.4*
Ferndale	3.50
Clemmons	3.43
Hill Middle	3.57
Starmount2	3.60
Southeast	3.43
Knox Middle1	3.86
Harris Road2	4.00
China Grove	3.93
J. N. Fries	3.71

Table 11

Non-Learner-Centered Teachers

Teacher	*M < 2.8*	*M < 2.4*	*M > 2.4*
East Forsythe	2.57	3.22	2.75
Flat Rock	2.64	3.22	2.58
CG Erwin2	2.50	3.00	3.25
CG Griffin2	2.64	3.67	3.75
Concord3	2.07	3.67	3.75

Five teachers (n = 5) met McCombs and Whisler's (1997) statistical definition of a non-learner-centered teacher. However, 13 teachers (n = 13) were below the validation

mean of $\underline{M} < 2.8$ for the learner-centered beliefs about the learner, teaching, and learning. So, this really means that 20 teachers (n = 20) were above the validation mean associated with non-learner-centered beliefs.

In retrospect, 22 (n = 22) teachers were above the validation mean of $\underline{M} > 2.4$ for the non-learner-centered beliefs about the learner and 20 teachers (n = 20) were above the validation mean of $\underline{M} > 2.4$ for non-learner-centered beliefs about teaching and learning (see Table 12 and Table 13).

Table 12

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

NLCB (Learners)	
Teacher	*M* > 2.4
Starmount1	2.89
Forbush2	2.56
East Forsythe	3.22
Flat Rock Middle	3.22
Kernersville	2.56
Starmount2	2.44
CC Erwin1	2.78
CC Erwin2	3.00
Hickory Ridge1	2.67
CC Griffin1	3.00
CC Erwin3	2.56
Concord Middle2	2.44
CC Griffin2	3.67
Southeast	2.78
Harris Road Middle2	2.44
Concord3	3.67
China Grove	3.00
J. N. Fries Middle	2.44
Hickory Ridge3	3.67
Corriher Lipe Middle2	3.33
Concord Middle4	3.00
Knox Middle2	2.56

Table 13

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

NLCB (Teaching and Learning)	
Teacher	*M* > 2.4
Forbush1	3.25
Forbush2	2.83
East Forsythe	2.75
Flat Rock	2.58
Ferndale	3.08
Forbush3	2.58
Starmount2	2.50
CC Erwin1	2.67
CC Erwin2	3.25
Concord2	2.92
CC Griffin2	3.75
Southeast	3.67
Harris Road2	3.42
Concord3	3.75
China Grove	3.58
J. N. Fries	2.92
Hickory Ridge3	4.00
Corriher Lipe Middle2	2.58
Concord Middle4	2.50
Knox Middle2	3.33

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 seventh grade mathematics section of the North Carolina EOG Assessment?

EOG disaggregate data for seventh grade mathematics for the 2010-2011 school year, provided by the North Carolina Department of Public Instruction, shows the total

number of students in each school who were proficient in mathematics for the 2010-2011 school year (see Table 14).

Table 14

Total Number of Students Proficient in Mathematics 2010-2011 School Year

Schools	*Total Students*	*Number of Students at or Above Level III*	*Percent Proficient*
Ferndale MS	236	167	70.8
Clemmons MS	238	197	82.8
East Forsythe MS	242	171	70.7
Flat Rock MS	280	218	77.9
Kernersville MS	255	223	87.5
Hill Middle	92	50	54.3
Forbush MS	269	209	77.7
Starmount MS	189	148	78.3
CC Griffin MS	218	194	89.0
Concord MS	273	205	75.1
Harris Road MS	501	433	86.4
Hickory Ridge MS	272	233	85.7
J N Fries MS	280	227	81.1
CC Erwin MS	314	221	70.4
China Grove MS	198	157	79.3
Corriher Lipe MS	180	134	74.4
Knox Middle	186	93	50.0
Southeast MS	246	191	77.6
West Rowan MS	229	187	81.7
Mt. Pleasant MS	209	192	91.9

An analysis of variance (ANOVA) was conducted to assess whether the North Carolina EOG Assessment scale score means were statistically and 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. Levene's test of homogeneity of variance was also conducted to analyze data between and within groups (see Table 15). The test results, F (**3, 128**) failed to identify a statistically significant difference. Because the overall F test was not significant, no follow-up tests were conducted.

Table 15

Analysis of Variance for Total Score

Source	*df*	*F*	*Sig.*
LCB	31	.007	.936
NLCBL	31	.201	.657
NLCBTL	31	.016	.901

Research question 3. Is there a difference in the level of learner-centered beliefs about the learner between teachers in schools with a higher percentage of students who met or exceeded state standards on the math section of the North Carolina EOG Assessment than those teachers with a lower percentage of students who met or exceeded state standards on the math section of the North Carolina EOG Assessment?

From the Teacher Beliefs Survey data, a total score was calculated and a total mean from each school's North Carolina EOG Assessment mean scale score (see Appendix I). To evaluate whether there was a statistical difference between higher and lower performing schools, an independent samples t-test was conducted on the level of

learner-centered beliefs (see Table 16 and 17). The test results, t (31) = .081, p = .936, failed to reject the null hypothesis at the p > .05 level of significance. Teachers in higher performing schools (M = 3.1778, SD = .45726) were slightly more learner-centered than teachers in lower performing schools (M = 3.1640, SD = .43169). The eta square index indicated that less than .05% of the variance of learner-centered beliefs was accounted for by whether a teacher was in a higher performing or a lower performing school.

Table 16

Difference Between High and Low Performing Schools: Learner-Centered Beliefs

		N	*Mean*	*Std. Deviation*	*Std. Error Mean*
LCB Mean	HP	23	3.1778	.45726	.09535
	LP	10	3.1640	.43169	.13651

Table 17

Independent Samples Test Between High and Low Performing Schools

	Levene's Test for Equality of Variances		*t-test*		
	F	*Sig.*	*T*	*df*	*Sig. (2-tailed)*
Equal variances assumed	.207	.633	.081	31	.936
Equal variances not assumed			.083	18.155	.935

Research question 4. Is there a difference in the level of non-learner-centered

beliefs about the learner between teachers in schools with a higher percentage of students who met or exceeded state standards on the math section of the North Carolina EOG Assessment than those teachers with a lower percentage of students who met or exceeded state standards on the math section of the North Carolina EOG Assessment?

To decipher if there was a statistical difference between higher and lower performing schools teacher scores on the level of non-learner-centered beliefs about the learner, another independent samples t-test was conducted (see Table 18 and 19). The test result, $t(31) = .449$, $p = .657$, supported the hypothesis that teachers in higher performing schools ($M = 2.6230$, $SD = .59289$) were less non-learner-centered about the learners than teachers in lower performing schools ($M = 2.5220$, $SD = .59766$).

Table 18

Difference Between High and Low Performing Schools: Non-Learner-Centered Beliefs about the Learner

	Schools	*N*	*M*	*SD*	*Std. Error Mean*
NLCBL	High	23	2.6230	.59289	.12363
	Low	10	2.5220	.59766	.18900

Table 19

Independent Samples Test Between High and Low Performing Schools: Non Learner-Centered Beliefs About The Learner

	Levene's Test for Equality of Variances		*t-test*		
	F	*Sig.*	*T*	*df*	*Sig. (2-tailed)*
Equal variances assumed	.000	.996	.449	31	.657
Equal variances not assumed			.447	17.071	.660

Research question 5. Is there a difference in the level of non-learner-centered beliefs about teaching and learning between teachers in schools with a higher percentage of students who met or exceeded state standards on the math section of the North Carolina EOG Assessment than those teachers with a lower percentage of students who met or exceeded state standards on the math section of the North Carolina EOG Assessment?

A third independent samples t-test was conducted to assess if a statistical difference existed between high performing schools teacher and lower performing schools teacher scores on the level of non-learner-centered beliefs about teaching and learning (see Table 20 and 21). The test result, $t(31) = .125$, $p = .901$, was counter to the hypothesis that teachers in higher performing schools ($M = 2.7061$, $SD = .75758$) were less non-learner-centered about the learners than teachers in lower performing schools ($M = 2.6740$, $SD = .42322$).

Table 20

Difference Between High And Low Performing Schools: Non-Learner-Centered About Teaching And Learning

		N	*M*	*SD*	*Std. Error Mean*
NLCBTL	High	23	2.7061	.75758	.15797
	Low	10	2.6740	.42322	.13383

Table 21

Independent Samples Test: Difference Between High And Low Performing Schools: Non-Learner-Centered About Teaching And Learning

	Levene's Test for Equality of Variances		*t-test*		
	F	*Sig.*	*T*	*df*	*Sig. (2-tailed)*
Equal variances assumed	3.482	0.72	.125	31	.901
Equal variances not assumed			.155	28.732	.878

Research question 6. What is the relationship of learner-centered beliefs held by teachers to student performance on the seventh grade mathematics section of the North Carolina EOG Assessment?

To determine if there was a relationship, correlation coefficients were computed among the three levels of learner-centered beliefs. Based on the correlational analysis presented in Table 22, there were two correlations that were statistically significant: the

correlation between learner-centered beliefs and non-learner-centered beliefs about the learner was significant, r (31) = -.36, p < .05; and the correlation between non-learner-centered beliefs about the learner and non-learner-centered beliefs about teaching and learning was significant, r (31) = .51, p < .01. The correlation of learner-centered beliefs with non-learner-centered beliefs about teaching and learning was lower and not significant.

Table 22

Correlations Among The Levels Of Learner-Centeredness

	LCB Mean	*NLCB (Learners)*	*NLCB (Teaching and Learning)*
LCB		-.531*	
NLCBL	-.531*		.611**
NLCBTL		.611**	

*p < .05 ** p < .01

Using the total score, a second set of correlation coefficients was computed among the three levels of learner-centered beliefs (see Table 23). The Learner-Centered Beliefs with the Total Score resulted in a correlation of r (31) = .134, p < .05. The Non-Learner-Centered Beliefs about the Learner with the Total Score correlation resulted in r (31) = -.619, p < .05. Finally, the correlation of the Non-Learner-Centered Beliefs about Teaching and Learning with the Total Score resulted in r (31) = .877, p < .05. In essence, statistical significant correlations for the Non-Learner-Centered Beliefs about the Learner and the Non-Learner-Centered Beliefs about Teaching and Learning were achieved and greater than .35.

Additionally, factor one or learner-centered beliefs about the learner, teaching,

and learning accounted for 12% or $\underline{r}^2 = .12$ of the explained variance. Factor two or non-learner-centered beliefs about the learner accounted for 38% or $\underline{r}^2 = .38$. Finally, factor three or non-learner-centered beliefs about teaching and learning resulted in $\underline{r}^2 = .59$ or 59% of the explained variance.

Table 23

Correlations Among The Levels Of Learner-Centeredness with Total Score

	LCB	*NLCB (Learners)*	*NLCB (Learning and Teaching)*
Total Score	.134	.619*	.877*

*p< .05

Using the mean scale scores among the three levels of Learner-Centered Beliefs, a third set of correlation coefficients was computed (see Table 24). The correlation of the learner-centered beliefs with the mean scale score resulted in $\underline{r}\ (31) = .128$, $\underline{p} < .425$. The Non-Learner-Centered Beliefs about the Learner with the mean scale score correlation resulted in $\underline{r}\ (31) = -.42$, $\underline{p} < .746$; and the Non-Learner-Centered Beliefs about Teaching and Learning with the mean scale score correlation resulted in $\underline{r}\ (31) = -.221$, $\underline{p} < .333$. As a result, there were no statistically significant correlations from this analysis.

Table 24

Correlations Among The Levels Of Learner-Centeredness with Mean Scale Score

	LCB	*NLCB (Learners)*	*NLCB (Teaching and Learning)*
Mean Scale Score	.128	-.42	-.221

Summary

Demographic information describing the participants in the study was presented. Descriptive statistics were presented to further describe statistically the participants and data collected from the Teacher Beliefs Survey. A statistical investigation of research questions were presented using Independent-Samples t Tests, Analysis of Variance, and the Pearson Product-Moment Correlation Coefficient. The results failed to reject the four null hypotheses from the cumulative data analysis and did not show statistically significant differences or correlations between learner-centered teachers, non-learner-centered teachers, and student performance of students on the seventh grade mathematics section of the 2010-2011 North Carolina EOG Assessment. Statistical significance was achieved with two of the three Pearson Product Moment Correlation Coefficient data analyses. However, this statistical significance failed to reject the null hypothesis at $p. <.05$. In Chapter 5 a detailed discussion of the results will be presented with the results reported in Chapter 4.

Chapter 5: Discussion

Chapter 5 is organized in the following manner: 1) a review of the purpose of this study, 2) a discussion of the results including the demographic information reported in Chapter 4, and 3) a conclusion accompanied by recommendations for future study.

Purpose of Study

The purpose of this study was first to determine the level of learner-centered beliefs of selected seventh grade mathematics teachers from nineteen middle schools located in the Piedmont-Triad and neighboring counties in the state of North Carolina. After establishing the level of learner-centered beliefs, this study investigated and examined if and to what extent differences as well as possible causal relationships existed between the level of teacher beliefs and the performance of students on the mathematics section on the North Carolina End-of-Grade (EOG) Assessment.

Demographic Information

Thirty-three (N = 33) seventh grade mathematics teachers from 19 (N = 19) different middle schools in the Piedmont-Triad and neighboring counties of North Carolina participated in this study. As identified as a potential limitation, the sample size (N = 33) was selected based primarily on the level of performance of seventh grade mathematic students on the 2011 spring EOG mathematics test. Gall, Borg, and Gall (1996) state, "[in] correlational research, it is traditional to use a minimum of 30 subjects" (p. 229). This study meets this minimum requirements, however, the small sample size does bring into question the external validity and reliability of the results. The conclusions from this study cannot be assumed to accurately reflect the results of all seventh grade mathematics teachers in the state of North Carolina. The design of the study was to look at mathematics teachers from schools from opposite levels of student

performance to ascertain if the level of learner-centered beliefs statistically differed. Once the schools were identified, the teachers from those schools were asked to participate irrespective to the number of seventh grade mathematics teachers at each school.

It is pertinent to point out that in this study the 23 (n = 23) higher performing schools had more teachers teaching mathematics in comparison to the 10 (n = 10) lower performing schools. Therefore, factors such as level of consistency of instruction, classroom assessment, teacher expectation, lesson design and preparation in lower performing schools may have a lower degree of variability given the number of staff teaching mathematics. Conversely, the higher performing schools would have higher variability in the aforementioned factors. Yet, this demographic information appeared not to be a factor or influence in the level of learner-centered beliefs. It may, however, be a factor or influence of student performance that was beyond the scope of this study.

Also noteworthy is the fact that the demographic information did not suggest a relationship between the levels of learner-centered beliefs based on total years of teaching, total years of teaching mathematics, total years of teaching middle school mathematics, areas of preparation, or highest degree earned. This may be a factor of student perception or performance that was beyond the scope of this study.

Learner-Centered Beliefs

McCombs and Whisler (1997) reported from the validation research on the Teacher Beliefs Survey that "teachers with learner-centered beliefs with means above 3.4 on factor 1 and below 2.0 on factors 2 and 3" (p. 231) were learner-centered. Additionally, "teachers with non-learner-centered beliefs were those with means below 2.8 on factor 1 and above 2.4 on factors 2 and 3" (McCombs & Whisler, 1997, p. 231).

From the literature review, four hypotheses were identified. The null hypotheses

for each of the four hypotheses were examined through six research questions. An investigation to test the null hypotheses for the first two hypotheses were presented for research questions number 1, 2, 3, 4 and 5. Research question number six was investigated to test the null hypothesis for hypotheses number 3 and 4.

Accordingly, each hypotheses accompanied by the appropriate research question(s) is discussed in the following section.

Hypothesis 1. Schools that have a higher percentage of students meeting or exceeding the state standard on the math section of the seventh grade North Carolina EOG assessment have learner-centered teachers teaching mathematics.

Hypothesis 2. Schools that have a lower percentage of students meeting or exceeding the state standard on the math section of the seventh grade North Carolina EOG assessment have non-learner-centered teachers teaching mathematics.

Research question 1. To determine the level of learner-centered beliefs of seventh grade mathematics teachers, the means from each factor were statistically compared to the validation means. The results as reported in Chapter 4 identified three teachers (n = 3) as meeting the statistical criteria for learner-centered. It was also reported that five teachers (n = 5) met the statistical criteria for non-learner-centered.

However, though only three teachers (n = 3) McCombs and Whisler (1997) statistical definition of a learner-centered teacher and two teachers (n = 2) met the criteria of a non-learner-centered teacher, nine teachers (n = 9) met or exceeded the validation mean of $\underline{M} > 3.4$ for the learner-centered beliefs about the learner, teaching, and learning. Further, 13 (n = 13) were below the validation mean $\underline{M} < 2.8$ for non-learner-centered beliefs about the learner, teaching, and learning. Thus, it is concluded that 11 teachers (n = 11) were neither learner-centered nor non-learner-centered about the learner, teaching,

and learning.

This finding, though not statistically significant, points to a better understanding about the participants in this study. That is, 72% of the teachers in the higher performing schools were learner-centered compared to 12% of the teachers from lower performing schools as it pertains to the learner-centered beliefs about the learner, teaching, and learning.

Consistent with the results of learner-centered teachers, five (n = 5) teachers met the McCombs and Whisler (1997) statistical definition of a non-learner-centered teacher. As previously stated, 13 (n = 13) teachers were below the validation mean of $\underline{M} < 2.8$ for the non-learner-centered beliefs about the learner, teaching, and learning. Though not statistically significant, this finding does suggest that the participants in this study were clearly more learner-centered than non-learner centered in their beliefs about the learner, teaching, and learning.

It was reported that 22 (n = 22) teachers were above the validation mean of $\underline{M} > 2.4$ for the non-learner-centered beliefs about the learner. Sixty percent of the lower performing schools teachers were non-learner-centered about the learner. Ninety-seven percent of the higher performing schools teachers were non-learner-centered about the learner. Though this finding appears to be a contradiction to the previous findings of the higher performing schools teachers, it actually reflects an equal balance. That is, exactly the same amount of higher performing schools' teachers was learner-centered as well as non-learner-centered. Thus, it is concluded that the higher performing schools' teachers were evenly split on their learner-centered beliefs.

Twenty teachers (n = 20) or 61% were above the validation mean of $\underline{M} > 2.4$ for non-learner-centered beliefs about teaching and learning. Ninety-seven percent of the

teachers in the higher performing schools were non-learner-centered compared to 61% of the teachers from lower performing schools as it pertains to the non-learner-centered beliefs about teaching, and learning.

The first and third findings describe an interesting distinction of lower performing schools. Although not statistically significant, the teachers in the lower performing schools had a lower percentage of teachers who held learner-centered beliefs and a higher percentage of teachers with non-learner-centered beliefs about teaching and learning. In comparison, the higher performing schools had exactly the same percentage of teachers who held learner-centered beliefs also were non-learner-centered in their beliefs about teaching and learning.

Additionally, a modified McCombs and Whisler (1997) statistical definition for learner-centered that uses a higher mean on the learner-centered beliefs for the learner, teaching, and learning and lower means on the non-learner-centered beliefs about the learner and non-learner-centered beliefs about teaching and learning results in 18 (n = 18) teachers being learner-centered and only 15 teachers (n = 15) being non-learner-centered.

There are at least four possible explanations that account for these findings. First, in the initial validation and subsequent follow-up studies using the Teacher Beliefs Survey researchers did not identify subject specific teachers as the single focus of their study. Thus, there may exist a unique set of variables including teacher preparation for mathematics, mathematics pedagogy, and possibly mathematics curriculum that prevents the differentiation of learner-centered from non-learner-centered beliefs of the teacher.

Second, as indicated previously in this chapter, the sample size is a limitation and is considered a plausible explanation. Third, the validation means derived at 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 schools.

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.

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 seventh grade mathematics section of the North Carolina 2011 EOG?

As reported in Chapter 4, an analysis of variance (ANOVA) was conducted to assess whether the North Carolina EOG Assessment 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, F (**3,128**) failed to identify a statistically significant difference at the p. > .05 level of significance. Accordingly, because the overall F test was not significant, no follow-up tests were conducted.

Research question 3. Is there a difference in the level of learner-centered beliefs about the learner between teachers in schools with a higher percentage of students who met or exceeded state standards on the math section of the North Carolina EOG Assessment than those teachers with a lower percentage of students who met or exceeded state standards on the math section of the North Carolina EOG Assessment?

Without a clear differentiation of learner-centered from non-learner-centered beliefs of seventh grade mathematics teachers, the ability to statistically investigate and

examine if and to what extent differences as well as possible causal relationships between the level of teacher beliefs and the performance of students on the mathematics section on the 2011 North Carolina EOG Assessment was problematic at best.

Nonetheless, the results of research question number three produced a t (31) = .081, p = .936 that subsequently failed to reject the null hypothesis at the $p > .05$ level of significance. Though teachers in higher performing schools (M = 3.1778, SD = .45726) were slightly more learner centered than teachers in lower performing schools (M = 3.1640, SD = .43169) the difference failed statistical significance.

As previously stated, the limited variation of learner-centeredness among the participants in this study is attributed to at least three possible explanations: 1) There may, in fact, be no difference between the learner-centered beliefs of mathematics teachers; 2) The level of learner-centered beliefs was determined by the teacher and does not take into account the actual practices or behaviors associated with learner-centeredness. Thus, it is possible that 28 participants (n = 28) were indecisive or conflicted about what they believe with relationship to what they practice and 3) Nevertheless, it is possible that teachers believe themselves to be learner-centered about the learner as did nine teachers (n = 9) in this study but not learner-centered in the areas of teaching and learning. Thus, the teachers in this study did not believe themselves to be learner-centered to the degree as the validation samples reported by McCombs and Whisler (1997).

Research question 4. Is there a difference in the level of non-learner-centered beliefs about the learner between teachers in schools with a higher percentage of students who met or exceeded state standards on the math section of the 2011 North Carolina EOG Assessment than those teachers with a lower percentage of students who met or

exceeded state standards on the math section of the North Carolina EOG?

As reported, the results of research question number 4 produced a t (31) = .449, p = .654 that subsequently failed to reject the null hypothesis at the $p > .05$ level of significance. Teachers in higher performing schools (M = 2.6230, SD = .59289) were less non-learner-centered about the learners than teachers in lower performing schools (M = 2.5220, SD = .59766). Though a difference was identified between these two groups of teachers, the difference failed to reach statistical significance.

Relative to the discussion related to research question number three, the limited variation of non-learner-centeredness among the participants in this study is attributed to at least two possible explanations: 1) There may, in fact, be no difference between the non-learner-centered beliefs of mathematics teachers as segregated by North Carolina EOG scores and 2) the possibility that teachers were indecisive or conflicted about what they believe with relationship to what they practice is also a consideration. With respect to the methodology employed in the validation research, McCombs and Whisler (1997) acknowledge the importance of cross-validating the teacher perceptions of learner-centered beliefs with student perceptions of teacher practices. However, this study was designed to ascertain if differences existed between what teachers themselves believed.

Thus, one conclusion is that the teachers in this study did not believe themselves to be non-learner-centered to the degree as the validation samples reported by McCombs and Whisler (1997). Hence, an additional explanation may in fact be that teachers of mathematics do not definitively believe themselves to be either learner-centered or non-learner-centered about the learner, teaching, and learning.

Research question 5. Is there a difference in the level of non-learner-centered beliefs about teaching and learning between teachers in schools with a higher percentage

of students who met or exceeded state standards on the math section of the 2011 North Carolina EOG Assessment than those teachers with a lower percentage of students who met or exceeded state standards on the math section of the North Carolina EOG?

Research question number 5 examined if a statistical difference existed between higher performing schools and lower performing schools teacher scores on the level of non-learner-centered beliefs about teaching and learning. It had been hypothesized that teachers in lower performing schools would have a higher percentage of teachers that were non-learner-centered in their beliefs about teaching and learning. The results failed to reject the null hypothesis. Specifically, as reported in Chapter 4, an independent t test resulted in a t (31) = .125, p = .901 that failed to reject the null hypothesis at the $p > .05$ level of significance.

Consistent with the previous discussion surrounding the results of research questions number 1, 2, 3, and 4, the inability to differentiate between learner-centered and non-learner-centered beliefs of seventh grade mathematics teachers severely limited and ultimately influenced the results of the aforementioned research questions.

In summary, the failure to reject both the first and second null hypotheses is explained, in part, by the sample size as well as the intentional selection of the participants from a single subject area. The previous research as reported by McCombs and Whisler (1997) did not discriminate by subject areas. Lastly, it is possible that the subject of seventh grade mathematics does not attract either educators that necessarily hold learner-centered or non-learner-centered beliefs about the learner, teaching, and learning.

Hypotheses 3 and 4 held that the results of data analysis would result in identifying a relationship between the levels of learner-centered beliefs with student

performance on the seventh grade North Carolina EOG mathematics test. To test these hypotheses, research question number 6 was investigated. The following section discusses these findings.

Hypothesis 3. There is a higher correlation between student performance on the seventh grade mathematics section of the North Carolina EOG Assessment with teachers with learner-centered beliefs.

Hypothesis 4. There is a higher inverse correlation between student performance on the seventh grade mathematics section of the North Carolina EOG Assessment with teachers with non-learner-centered beliefs.

Research question 6. What is the relationship of learner-centered beliefs held by teachers to student performance on the seventh grade mathematics section of the North Carolina EOG Assessment?

To answer this question it was necessary to conduct three separate Pearson Product Moment Correlations. The first correlation coefficient looked at the relationship of learner-centered beliefs with both the non-learner-centered beliefs about the learner and non-learner-centered beliefs about teaching and learning. As reported, two correlations were statistically significant. Specifically, the correlation between learner-centered beliefs and non-learner-centered beliefs, $\underline{r}\ (31) = -.36$, $\underline{p} < .05$ and the correlation between non-learner-centered beliefs about the learner and non-learner-centered beliefs about teaching and learning, $\underline{r}\ (31) = .51$, $\underline{p} < .01$ were consistent with previous research (McCombs & Whisler, 1997).

It stands to reason that if a teacher has learner-centered beliefs then an inverse correlation with non-learner-centered beliefs about the learner as well as with non-learner-centered beliefs about teaching and learning would exist. However, the results of

this study did not support this assumption statistically. Though a negative correlation did result in a r (31) = -.16, it failed to reach the $p < .05$ level of significance.

As has been stated in the discussion of the previous research questions, there are several possible explanations for this finding. These explanations include the limited sample size as well as the inability to differentiate participants in this study with learner-centered beliefs about the learner, teaching and learning from those with non-learner-centered beliefs about the learner, teaching, and learning.

A second set of correlational coefficients was computed to ascertain the level of relationship of each of the three factors with a Total Learner Centered Beliefs Score. The correlation of the Learner-Centered Beliefs with the Total Score resulted in r (31) = .35, $p < .05$. The correlation of the Non-Learner-Centered Beliefs about the Learner with the Total Score resulted in r (31) = .62, $p < .05$. The correlation of the Non-Learner-Centered Beliefs about Teaching and Learning with the Total Score resulted in r (31) = .77, $p < .05$. Thus, statistical significant correlations were achieved and were equal to or greater than .35.

As stated, non-learner-centered beliefs about teaching and learning had the highest correlation. As such, it also had the largest amount of explained variance, $r^2 = .59$ or 59%, of the total score. This finding is consistent with the fact that only three teachers met the statistical definition of learner-centered. Thus, the magnitude of the explained variance of the non-learner-centered beliefs about teaching and learning accounting for nearly 60% of the Total Score is neither unrealistic nor inconsistent with the results of the previous research findings in this study.

A third set of correlation coefficients was computed among the three levels of Learner-Centered Beliefs with the mean scale scores (see Appendix I). As reported in

Chapter 4, the correlation of Learner-Centered Beliefs with the mean scale score resulted in $\underline{r}$ (31) = .14, $\underline{p}$ < .425 that failed to achieve statistical significance at the $\underline{p}$ < .05 level of confidence. The correlation of the Non-Learner-Centered Beliefs about the Learner with the mean scale score resulted in $\underline{r}$ (31) = -.06, $\underline{p}$ < .746 also failed to achieve statistical significance at the $\underline{p}$ < .05 level of confidence. Finally, the correlation of the Non-Learner-Centered Beliefs about Teaching and Learning with the mean scale score resulted in $\underline{r}$ (31) = .17, $\underline{p}$ < .333 and also failed to achieve statistical significance at the $\underline{p}$ < .05 level of confidence.

As stated previously, the findings of the third set of correlation coefficients are explained in part by the limited sample size and the inability to statistically differentiate learner centered from non-learner-centered mathematics teachers.

As reported, the results yielded no significant correlation between the level of learner-centered beliefs and the level of performance on the seventh grade mathematics section of the North Carolina EOG Assessment. Consequently the results of the third set of correlation coefficients failed to reject both the third and fourth null hypotheses. However, the non-significant finding of this study is not without value.

As has been discussed, the failure to clearly define a statistical difference between the learner-centered beliefs about the learner, teaching, and learning and non-learner-centered beliefs about teaching and learning of seventh grade mathematics teachers limited further data analysis. It has also been discussed that previous research using the Teacher Beliefs Survey did not differentiate teachers by subject matter to the extent of this study. Arguably, ascertaining the level of learner-centeredness without consideration to the variability of training of mathematics instructors, mathematics pedagogy, as well as variability of mathematics curriculum was not considered as potential limiting variables.

Accordingly, it is concluded that this study found that student achievement as defined by the seventh grade mathematics section of the 2011 North Carolina EOG Assessment was not determined or influenced positively by the level of learner-centered beliefs of their mathematics instructors.

Conversely, this study found that the level of learner-centered beliefs of their mathematics instructors did not negatively influence student achievement on the seventh grade mathematics section of the 2010-2011 North Carolina EOG Assessment.

Thus, the theory of learner-centered beliefs about the learner, teaching, and learning correlating with different levels of student achievement is not supported in the findings of this study. However, the fact that the theory is not supported does not necessarily diminish its importance.

McCombs and Whisler (1997) postulated that learner-centered beliefs correlated with student learning and achievement. The validation as well as subsequent research (Alexander & Murphy, 1998; Lambert & McCombs, 1998; McCombs, 1993, 1994, 1995, 2000; McCombs & Whisler, 1997) found that growth or improvement in learning as measured by classroom assessments over time was correlated with the level of learner-centered beliefs of the teacher. However, student learning was measured over time and not as a single event. This present study looked at student achievement as measured by a performance-based assessment that was, in fact, a single event. Thus, one conclusion is that learner-centered beliefs do not influence single event assessment external to classroom assessments.

Further, it is possible that growth in learning not achievement is influenced or determined by learner-centered beliefs. Orton (1996) stated, “Teacher beliefs are related to student learning through … sequences of events, mediated by the teacher, that happen

in the classroom" (p. 1). His research examined the differing roles of teacher beliefs on student learning and concluded that the relationship of the teacher and teacher beliefs with student learning was significant.

Accordingly, the influence of learner-centered beliefs on student achievement as found in this study remains theoretical not empirical. Sample (2002) stated, "until [a] theory is in fact disproved or falsified, until it is found to be at odds with experimental evidence, it is accepted as being true" (p. 45). In a like manner, Sample (2002) points out that in the social sciences, "the dictum that any theory is true unless and until is it falsified by experiment" (p. 48) has dominated contemporary practice in several fields chief among them education where it has been both costly in financial terms but equally expensive in morale and trust with educators, parents, and the public.

For that reason, the findings of this present study contribute to the body of knowledge that seeks to identify the variables that can be eliminated from the theoretical because they do not directly influence and cause improved student achievement.

Recommendations

Throughout this study, it has become clear that there is a need for continued research on the variables that influence student achievement. Although much theory, research, conjecture, and speculation about what influences student learning and achievement has been written and debated, there remains a need to look at what specifically influences student performance on the seventh grade mathematics section of the North Carolina EOG Assessment. There remains remarkably little, if any empirical research on those variables that influence student performance and achievement on the North Carolina EOG Assessment, especially at the middle school level. Let it suffice, middle level education is in need of purposeful research targeted at investigating and

examining those factors and variables that positively influence student learning and achievement. With this consideration, there are three recommendations for future research listed below. Each would assist in increasing the knowledge base of how to improve student learning and achievement.

A replication of the study just completed should take place with a probability sample of mathematics teachers, specifically entire middle school mathematics departments from each middle school. This would increase the likelihood of differentiating learner-centered from non-learner-centered teachers. In retrospect, an increased and carefully selected sample size will increase the generalizability of the findings. Finally, an increased number of participants will allow the researcher to ascertain if the level of learner-centered beliefs about the learner, teaching, and learning of mathematics teacher can statistically be defined, compared, and correlated with student achievement as measured by a performance-based assessment.

A second recommendation for future research is to incorporate the general design of the completed study and add either the Reading section or Writing section or both of the North Carolina EOG Assessment as well as those teachers responsible for the instruction of those subjects. In keeping with the first recommendation, it would be advised to increase the sample size as well as the number of middle schools. A slight variation of this recommendation would be to include whole school faculties and complete the North Carolina EOG Assessment. Most middle school students see anywhere between four to seven different teachers in a school day. This recommendation, therefore, would take into account that multiple teachers are factors in the performance and learning achievement levels of students.

Finally, a third recommended study is to investigate learner-centered beliefs of

middle school teachers along with student, parent, and peer assessment of teacher practices to ascertain if and to what extent a difference exists between each group. In addition, this study could include, not unlike the validation and follow-up research reported by McCombs and Whisler (1997), an investigation of relationships between student achievement with teacher and student levels of identified learner-centered beliefs.

Concluding Remarks

This study did not find statistical significance with respect to a difference between learner-centered and non-learner-centered mathematics teachers. Equally, this study did not find a relationship of statistical significance between learner-centered beliefs and non-learner-centered beliefs with student achievement as measured by the seventh grade mathematics section of the 2011 North Carolina EOG Assessment. However, these findings should not be interpreted to mean that there is no relationship between learner-centered beliefs as well as non-learner-centered beliefs of teachers with student learning and student achievement.

The introduction of this study began with the identification of three interdependent components of a school system. Two of these components, Technical and Organizational, have dominated the literature, research, and activity associated with school reform and change (Marzano & Kendal, 1999). The third area, Personal, has had very limited empirical research conducted to study its impact on student learning and achievement. Thus, this study adds to the research base about the difference as well as causal relationship of teacher beliefs and student achievement.

Though the findings of this study were less than dramatic, they are informative for educators interested in identifying variables influencing both student learning and achievement. For example, it was learned from this study that mathematics teachers are

neither learner-centered nor non-learner-centered. This information in and of itself may assist middle level staff developers in identifying and designing training focused on effective instructional strategies for middle level mathematics that appeal to beliefs across the spectrum.

The findings of this study also challenge the assumption that teachers in lower performing schools differ in their beliefs about the learner, teaching, and learning from teachers in higher performing schools. Conversely, the perception that teachers in higher performing schools expose more learner-centered beliefs than those in lower performing schools was also challenged by the results.

Though the findings of this study did not support the results found by McCombs and Whisler (1997), it does support the assertion by Lezotte (1997) and Bowsher (2001) that educational reform has shifted from teacher-centered to learning-centered but has not yet transformed to learner-centered. As Lezotte has postulated, the transformation to learner-centered requires a deeply held belief that all students can and must learn what we want them to, whatever it takes. Arguably, there is a strongly held belief that some, if not many, students will never learn. Thus, there remains a formidable task in changing teacher beliefs about the learner, teaching and learning to become more learner-centered.

Finally, as stated in the beginning of this study, the achievement results to date suggest that the promises of school reform are far from being realized (Fouts, 1999; Fouts, Stuen, Anderson, & Parnell, 2000). These inconsistent results, coupled with the inability to clearly identify the factors or variables correlated with improved student achievement as measured by the North Carolina EOG Assessment, remain inconclusive at best. This study unfortunately is now counted among the research that has investigated but failed to clearly identify the factors or variables that positively influence student

learning and achievement.

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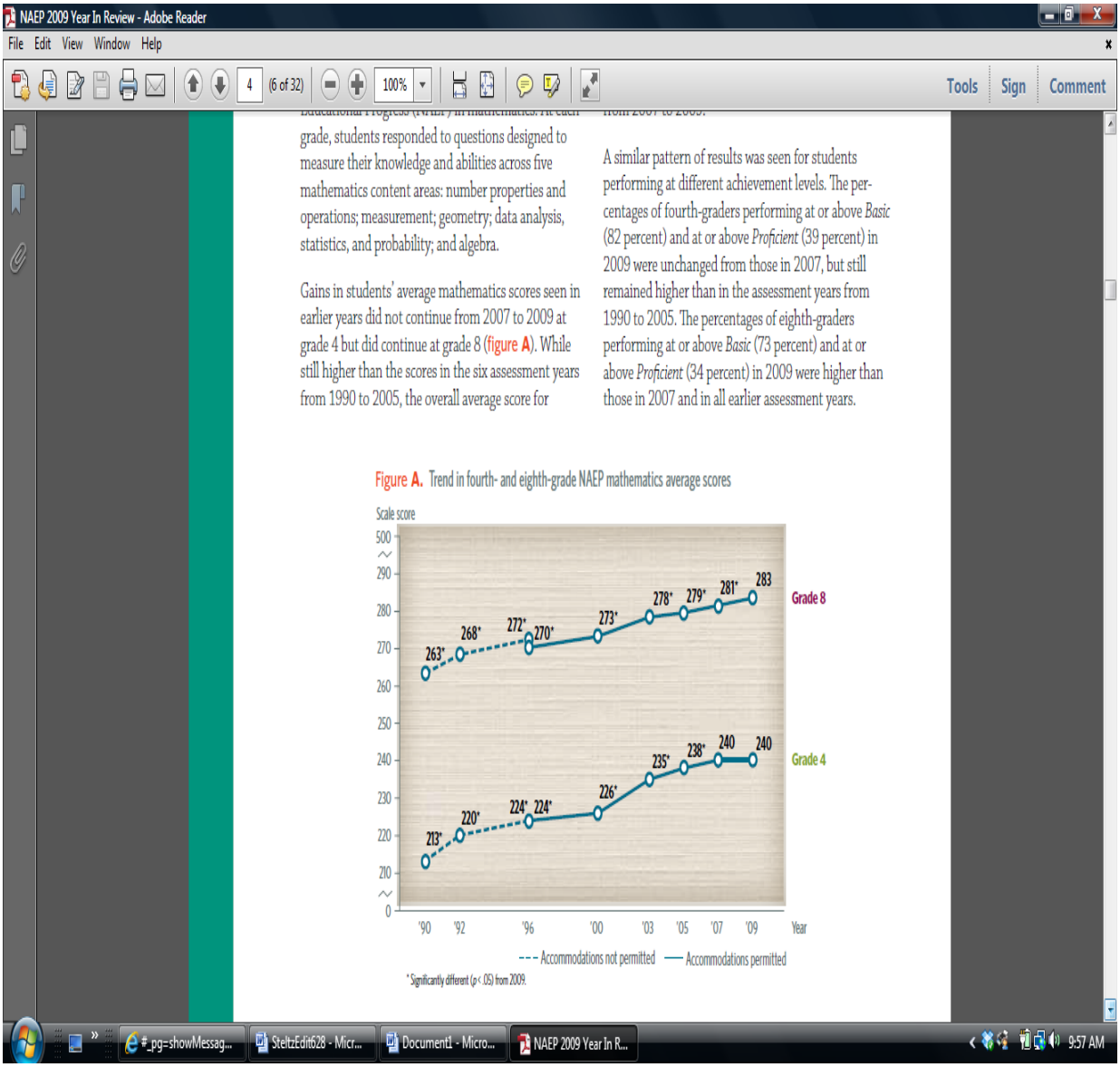
Appendix A

National Assessment for Education Progress (NAEP)

2009 Report

NAEP 2009 Year in Review



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Appendix B

Trends in International Mathematics and Science Study (TIMSS) 2007 International Benchmarks of Mathematics Achievement

TIMSS 2007 International Benchmarks of Mathematics Achievement

Grade four				Grade eight			
	Average score		Difference[1]		Average score		Difference[1]
Country	1995	2007	2007-1995	Country	1995	2007	2007-1995
England	484	541	57*	Colombia	332	380	47*
Hong Kong SAR[2]	557	607	50*	Lithuania	472	506	34*
Slovenia	462	502	40*	Korea, Rep. of	581	597	17*
Latvia[3]	499	537	38*	**United States[4, 5]**	**492**	**508**	**16***
New Zealand	469	492	23*	England4	498	513	16*
Australia	495	516	22*	Slovenia	494	501	7*
Iran, Islamic Rep. of	387	402	15*	Hong Kong SAR[2, 4]	569	572	4
United States[4, 5]	**518**	**529**	**11***	Cyprus	468	465	-2
Singapore	590	599	9	Scotland[4]	493	487	-6
Scotland[4]	493	494	1	Hungary	527	517	-10*
Japan	567	568	1	Japan	581	570	-11*
Norway	476	473	-3	Russian Federation	524	512	-12
Hungary	521	510	-12*	Romania	474	461	-12*
Netherlands[6]	549	535	-14*	Australia	509	496	-13*
Austria	531	505	-25*	Iran, Islamic Rep. of	418	403	-15*
Czech Republic	541	486	-54*	Singapore	609	593	-16*
				Norway	498	469	-29*
				Czech Republic	546	504	-42*
				Sweden	540	491	-48*
				Bulgaria	527	464	-63*

Country difference in average scores between 1995 and 2007 is greater than analogous U.S. difference ($p < .05$)
Country difference in average scores between 1995 and 2007 is not measurably different from analogous U.S. difference ($p < .05$)
Country difference in average scores between 1995 and 2007 is less than analogous U.S. difference ($p < .05$)
*$p < .05$. Within-country difference between 1995 and 2007 average scores is significant.
[1] Difference calculated by subtracting 1995 from 2007 estimate using unrounded numbers.
[2] Hong Kong is a Special Administrative Region (SAR) of the People's Republic of China.
[3] In 2007, National Target Population did not include all of the International Target Population defined by the Trends in International Mathematics and Science Study (TIMSS).
[4] In 2007, met guidelines for sample participation rates only after substitute schools were included.
[5] In 2007, National Defined Population covered 90 percent to 95 percent of National Target Population.
[6] In 2007, nearly satisfied guidelines for sample participation rates only after substitute schools were included.

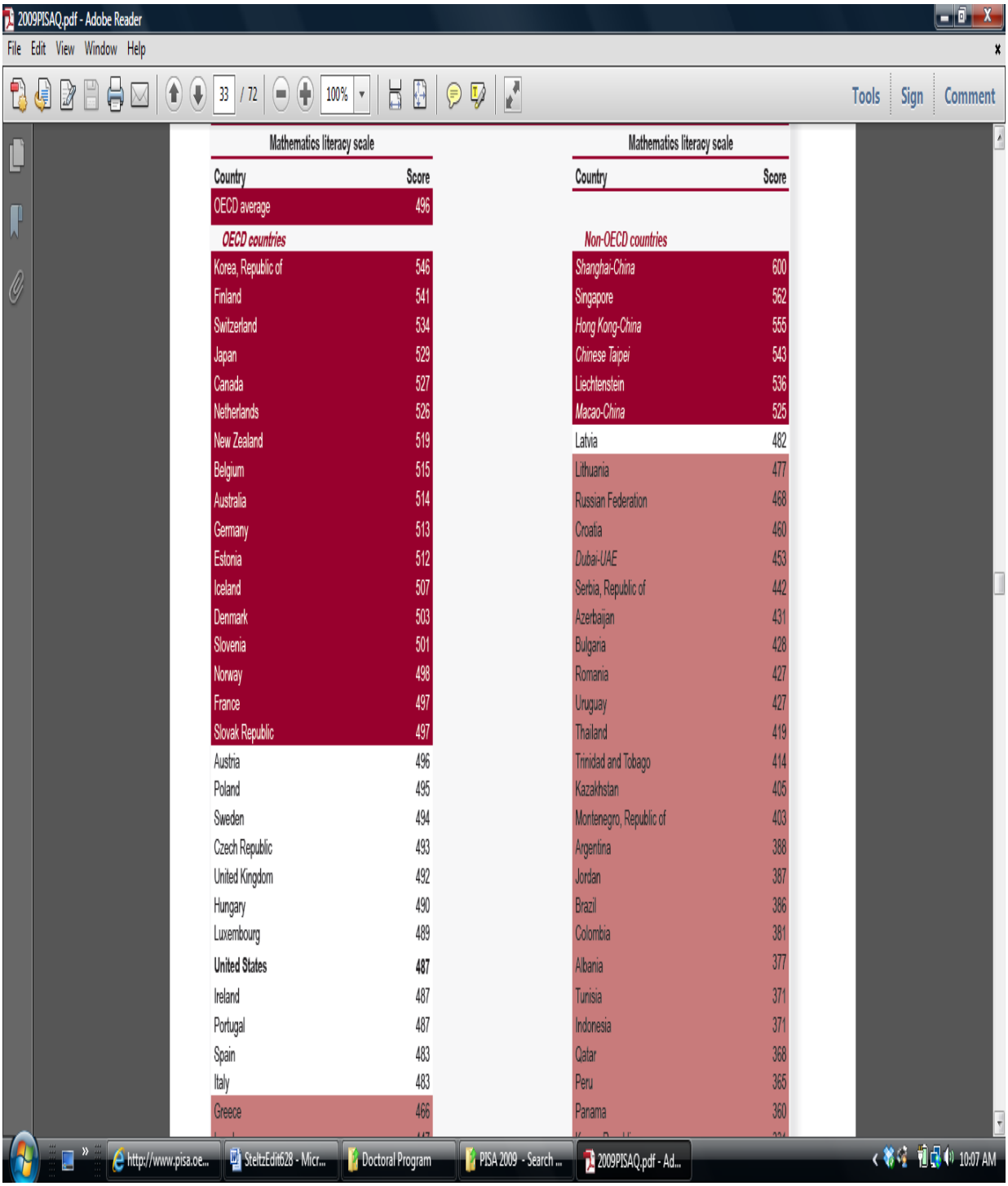
Retrieved from: http://timss.bc.edu/TIMSS2007/PDF/T07_M_IR_Chapter1.pdf

Appendix C

Organization for Economic Cooperation and Development

Program for International Student Assessment (PISA) 2009 Report

PISA 2009 Report



Mathematics literacy scale	
Country	Score
OECD average	496
OECD countries	
Korea, Republic of	546
Finland	541
Switzerland	534
Japan	529
Canada	527
Netherlands	526
New Zealand	519
Belgium	515
Australia	514
Germany	513
Estonia	512
Iceland	507
Denmark	503
Slovenia	501
Norway	498
France	497
Slovak Republic	497
Austria	496
Poland	495
Sweden	494
Czech Republic	493
United Kingdom	492
Hungary	490
Luxembourg	489
United States	**487**
Ireland	487
Portugal	487
Spain	483
Italy	483
Greece	466

Mathematics literacy scale	
Country	Score
Non-OECD countries	
Shanghai-China	600
Singapore	562
Hong Kong-China	555
Chinese Taipei	543
Liechtenstein	536
Macao-China	525
Latvia	482
Lithuania	477
Russian Federation	468
Croatia	460
Dubai-UAE	453
Serbia, Republic of	442
Azerbaijan	431
Bulgaria	428
Romania	427
Uruguay	427
Thailand	419
Trinidad and Tobago	414
Kazakhstan	405
Montenegro, Republic of	403
Argentina	388
Jordan	387
Brazil	386
Colombia	381
Albania	377
Tunisia	371
Indonesia	371
Qatar	368
Peru	365
Panama	360

Retrieved from: http://www.pisa.oecd.org/dataoecd/54/12/46643496.pdf

Appendix D

Mid-Continent Regional Education Laboratory

Mathematics Standards

Mid-Continent Regional Education Laboratory
Mathematics Standards

1. Uses a variety of strategies in the problem-solving process
2. Understands and applies basic and advanced properties of the concepts of numbers
3. Uses basic and advanced procedures while performing the processes of computation
4. Understands and applies basic and advanced properties of the concepts of measurement
5. Understands and applies basic and advanced properties of the concepts of geometry
6. Understands and applies basic and advanced concepts of statistics and data analysis
7. Understands and applies basic and advanced concepts of probability
8. Understands and applies basic and advanced properties of functions and algebra
9. Understands the general nature and uses of mathematics

Retrieved from:
http://www.mcrel.org/compendium/standardDetails.asp?subjectID=1&standardID=9

Appendix E

American Psychological Association and McREL

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.

Retrieved from: http://www.cdl.org/resource-library/articles/learner_centered.php

Appendix F

Seven Correlates of Effective Schools

Seven Correlates of Effective Schools

1. Instructional Leadership

The effective school practices that the principal is the "leader of leaders" not the "leader of followers." The principal understands and applies the characteristics of instructional effectiveness in the management of the instructional program. The principal and all adults must take an active role in instructional leadership.

2. Clearly Stated and Focused Mission

The effective school has a clearly articulated mission. The staff shares an understanding and commitment to the mission and the instructional goals, priorities, and assessment procedures it projects. The staff accepts responsibility and accountability for promoting and achieving the mission of learning for all students.

3. Safe and Positive Environment

The effective school has a positive, purposeful, businesslike environment, which is free from the threat of physical harm. Desirable student behaviors are consistently articulated and expectations are clear. Students and teachers help each other and what is best for all. This environment nurtures interaction between students and teachers that is collaborative, cooperative, and student centered.

4. High Expectations for ALL Students

The effective school expects that all students can attain mastery of the essential school skills. In order to meet these high expectations, a school is restructured to be an institution designed for "learning" not "instruction." Teachers and students must have access to "tools" and "time" to help all students learn.

5. Frequent Monitoring of Student Progress

The effective school frequently measures academic student progress through a variety of assessment procedures. Assessment results are used to improve individual student performance and also improve instructional delivery. Assessment results will show that alignment must exist between the intended, taught, and tested curriculum.

6. Maximize Learning Opportunities

The effective school allocates and protects a significant amount of time for instruction of the essential skills. The instruction must take place in an integrated, interdisciplinary curriculum. Effective instruction time must focus on skills and curriculum content that are considered essential, that are assessed, and most valued. There should be abandonment of less important content.

7. Positive Communication - School, Home, Community

The effective school builds trust and communication within the school, parents and community. Forming partnerships with the parents and community enables all stakeholders to support the mission of the school and have the same goals and expectations.

Retrieved from: http://ces.ou.edu/7_correlates_effectiveness.html

Appendix G

Staff Informed Consent Letter to Participate in the

Teacher Beliefs Survey

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 any differences, and investigate possible relationships between the role of teacher beliefs and learner-centered education with student achievement. Your decision to participate is voluntary.

Specifically, I am asking that you complete the Teacher Beliefs Survey by March 15, 2012. The web address is https://www.surveymonkey.com/s/DC88FBW, and 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 more than 5 minutes to complete. **There are no risks associated with completing the survey.**

Your school was selected because it is part of the Piedmont-Triad region and was based on the results of the 2011 North Carolina 7th Grade End-of-Grade Mathematics Assessment. 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. I know this because I currently teach 7th grade mathematics.

Unlike previous research on school reform that has consistently addressed the technical and organizational changes in our present system, this study seeks to examine the personal domain which the Mid-continent Regional Educational Laboratory (McREL) identified and explored teacher beliefs and practices considered learner-centered and the degree to which student achievement, motivation, and learning is influenced. The current study seeks to ascertain if there is a difference and/or a relationship between teachers' learner-centered beliefs and student achievement.

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 Piedmont-Triad school systems.

As indicated, I will return to you the findings of the study as well as your specific schools' 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 https://www.surveymonkey.com/s/DC88FBW. 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 (704-213-4655) or by email (msteltz@gardner-webb.edu).

Thank you in advance for your support,

Mary A. Steltz
Doctoral Candidate
Gardner-Webb University

Appendix H

Mid-continent Regional Educational Laboratory (McREL)

Background Information and Teacher Beliefs Survey

Part I Background/Demographic Information
Select your response to the 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 41+

6. What is the Highest degree earned?
   A BA/BS
   B MA/MS
   C Ed.D/PhD

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

10. What is the name of your school?
    (Open Response)

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
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

Statement	Strongly Disagree	Somewhat Disagree	Somewhat Agree	Strongly Agree
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
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

Statement	Strongly Disagree	Somewhat Disagree	Somewhat Agree	Strongly Agree
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
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
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

Statement	**Strongly Disagree**	**Somewhat Disagree**	**Somewhat Agree**	**Strongly Agree**
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	1	2	3	4

how they learn.				
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 I

North Carolina End-of-Grade Assessment Mean Scale Scores

Students At or Above Level III on Mathematics Section of North Carolina End-of-Grade Assessment in 2011

	Number at or Above Level III	Percent at or Above Level III	Number Valid Scores	Average Scale Score
Ferndale MS	167	70.8	236	358.7
Clemmons MS	197	82.8	238	360.8
East Forsythe MS	171	70.7	242	358.0
Flat Rock MS	218	77.9	280	358.3
Kernersville MS	223	87.5	255	362.7
Hill MS	50	54.3	92	354.7
Forbush MS	209	77.7	269	360.2
Starmount MS	148	78.3	189	359.9
CC Griffin MS	194	89.0	218	362.0
Concord MS	205	75.1	273	360.0
Harris Road MS	433	86.4	501	363.2
Hickory Ridge MS	233	85.7	272	363.1
J N Fries MS	227	81.1	280	360.5
Erwin MS	221	70.4	314	359.0
China Grove MS	157	79.3	198	360.1
Corriher Lipe MS	134	74.4	180	358.1
Knox MS	93	50.0	186	354.7
Southeast MS	191	77.6	246	361.1
Mt. Pleasant	192	91.9	209	362.5

Information provided by North Carolina Department of Public Instruction.