Factors which influence low-income African American middle school students in mathematics

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ABSTRACT

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FACTORS WHICH INFLUENCE LOW-INCOME AFRICAN-AMERICAN
MIDDLE SCHOOL STUDENTS IN MATHEMATICS

Advisor: Dr. Trevor Turner

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Factors which influence low-income African-American middle school students in mathematics were examined in this study. Likewise, this study examined the extent to which student achievement in mathematics at the middle school level in a metropolitan Atlanta school district may be explained by certain school and teacher related variables such as instructional strategies, classroom management, teacher expectations, site-based professional learning, and teacher satisfaction with resources and how these factors might impact or cause a difference in student achievement in math as measured by the 2007 Criteria Referenced Competency Test (CRCT) scores. The research presented in this dissertation provides a starting point for developing school plans to improve mathematics instruction. The practices identified reflect a mixture of emerging strategies and practices in long-term use.
This study was based on the assumption that instructional strategies, classroom management, teacher expectations, site-based professional learning, and teacher satisfaction with resources would have a significant impact in middle school students’ math achievement. It is presumed that this study would assist leaders in providing quality instruction that would benefit teachers and low income, minority children. This study is expected to further assist principals and/or leaders in providing quality leadership that will benefit middle school teachers in low-income School Wide Title I middle schools and meet the needs of their students.

The significance of this study is in assistance that it can give administrators in structuring site-based professional learning and development programs along with arranging for monitoring and communication methods that will meet the needs of teachers and students. Additionally, this research will add to a body of scholarship and may cause individuals to examine and put into place, or remove certain policies and practices in middle school math classes. As a final point, this research will determine the need for additional research.

The methodology employed a quantitative, quasi-experimental, ex-post facto design to review possible variables that may affect student achievement in mathematics grades six through eight. The researcher found that there was no relationship between student achievement in mathematics and the independent variables. The only significant relationship found in this study was that there was a relationship between student achievement in mathematics as measured by the CRCT and teacher preparation. Teachers with college or university based preparation had students with higher student achievement performance levels.
FACTORS WHICH INFLUENCE LOW-INCOME AFRICAN-AMERICAN MIDDLE SCHOOL STUDENTS IN MATHEMATICS

A DISSERTATION
SUBMITTED TO THE FACULTY OF CLARK ATLANTA UNIVERSITY
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THE DOCTOR OF EDUCATION

BY

CANDACE Y. ALEXANDER

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I hereby dedicate this dissertation to Dr. Turner, my advisor; his leadership motivated me to stick to our timeline. He always met with me and gave the unsurpassed guidance and advice. He motivated me to stick to a timeline and helped me make the necessary corrections for approval. As well, Dr. Turner, Dr. Persuad, and Dr. Shelia Gregory provided the guidance through the prospectus that really helped me further develop my dissertation. The team helped me become a better researcher and presenter.

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CHAPTER I
INTRODUCTION

The Need for Renewing Our Schools

This study examines the extent to which student achievement in mathematics at the middle school level in a metropolitan Atlanta school district may be explained by certain school and teacher related variables such as instructional strategies, classroom management, teacher expectations, site-based professional learning, and teacher satisfaction with resources and how these factors might impact or cause a difference in student achievement in math as measured by the 2007 Criteria Referenced Competency Test (CRCT) scores.

In an effort to address this dilemma, an instructional program was purchased three years ago that infused a variety of instructional strategies and resources into the mathematics and language arts curriculum. New academic programs have been implemented in all middle schools. This comprehensive program uses hands-on activities—often related to current events or pop cultures—to help teach concepts in math and language arts. This instructional resource provided rigor and relevance as it introduced benchmark/pretests, embedded diagnostic assessments, and posttests as measures to monitor and evaluate student achievement every four to six weeks.

The results are computer-generated and analyzed at cluster meetings with Instructional/Resource Coaches at the local site. Additionally, this instructional resource
provides professional learning sessions at cluster meetings outside of the building with program coordinators. The program is designed to allow collaboration with the use of data which will, in turn, help assess the readiness level of the students and "drive" the instructional program. Although many components of the program may have been successful in other areas, its lack of efficiency in the area of mathematics justifies a need for this study.

Like reading, mathematics is a subject that is indeed necessary for functioning adequately in society. More than that, mathematics is a subject that should be more enjoyable than it sometimes is for our students. In fact, one of the goals of the National Council of Teachers of Mathematics (NCTM) is to help students appreciate and enjoy mathematics. This goal, coupled with the task of nurturing children's confidence in their ability to apply their mathematical knowledge to solve real-life problems, is a challenge facing every parent today (Hartog, 2005). So how do we address these academic challenges in mathematics?

*Instructional Strategies and Level 1 students*

No Child Left Behind brought the needed attention to holding schools accountable and measuring academic progress; however, it did not address the basic challenges facing our educational system. The core of the NCLB Act is an achievement testing program and in order to receive federal funds, every state was to test public school students' reading and math skills and then account for how many students performed at each of three levels of skill—basic, proficient, and advanced. The goal is to have all students scoring at or above the proficient level by 2014. Additionally, any school
having students who failed to make sufficient progress toward the 2014 goal would face consequences—students transfers, administrative/staff changes, even restructuring. In view of that, what does it take to prepare our children to face the 21st century math curriculum? In order to increase student achievement in mathematics, we must start in the classroom with good instruction.

Many changes in the classroom start with good instruction. Research can and should provide some clear guidance on the specifics of effective teaching. According to Marzano (2003), a teacher-level factor which affects student success, is instructional strategies. Most successful teachers make use of valuable strategies and have more instructional strategies at their disposal. An expert teacher has acquired a wide collection of instructional strategies along with the expertise of when these strategies might be most helpful for students. What, then, are the instructional strategies that have proven to be the most useful?

Research findings indicate that certain teaching strategies and methods are worth careful consideration as teachers strive to improve their mathematics teaching practices. The extent of the students' opportunity to learn mathematics content bears directly and decisively on student mathematics achievement. Opportunity to learn (OTL) was studied in the First International Mathematics Study (Husen, 1967), where teachers were asked to rate the extent of student exposure to particular mathematical concepts and skills. Strong correlations were found between OTL scores and mean student achievement scores, with high OTL scores associated with high achievement. The link was also found in subsequent international studies, such as the Second International Mathematics Study.
(McKnight, Crosswhite, & Dossey, 1987) and the Third International Mathematics and Science study (TIMSS) (Schmidt, McKnight, & Raizen, 1997).

Further, focusing instruction on the meaningful development of important mathematical ideas increases the level of student learning. Investigations have consistently shown that an emphasis on teaching for meaning has positive effects on student learning, including better initial learning, greater retention and an increased likelihood that the ideas will be used in new situations. In addition, students can learn both concepts and skills by solving problems. Research suggests that students who develop conceptual understanding early perform best on procedural knowledge later. Students with good conceptual understanding are able to perform successfully on near-transfer tasks and to develop procedures and skills they have not been taught. Students with low levels of conceptual understanding need more practice in order to acquire procedural knowledge.

Giving students both an opportunity to discover and invent new knowledge and an opportunity to practice what they have learned improves student achievement. Data from the TIMSS video study show that over 90% of mathematics class time in the United States' eighth-grade classrooms is spent practicing routine procedures, with the remaining time generally spent applying procedures in new situations. Virtually no time is spent inventing new procedures and analyzing unfamiliar situations. In contrast, students at the same grade level in typical Japanese classrooms spend approximately 40% of instructional time practicing routine procedures, 15% applying procedures in new situations, and 45% inventing new procedures and analyzing new situations.
Students need opportunities for both practice and invention. Findings from a number of studies show that when students discover mathematical ideas and invent mathematical procedures, they have a stronger conceptual understanding of connections between mathematical ideas. Therefore, teaching that incorporates students' intuitive solution methods can increase student learning, especially when combined with opportunities for student interaction and discussion. Student achievement and understanding are significantly improved when teachers are aware of how students construct knowledge, are familiar with the intuitive solution methods that students use when they solve problems, and utilize this knowledge when planning and conducting instruction in mathematics. Structuring instruction around carefully chosen problems, allowing students to interact when solving problems, and then providing opportunities for them to share their solution methods result in increased achievement on problem-solving measures. These gains come without a loss of achievement in the skills and concepts measured on standardized achievement tests.

Whole-class discussion following individual and group work improves student achievement. Research suggests that whole class discussion can be effective when it is used for sharing and explaining the variety of solutions by which individual students have solved problems. It allows students to see the many ways of examining a situation and the variety of appropriate and acceptable solutions. Wood (1999) found that whole-class discussion works best when discussion expectations are clearly understood. Students should be expected to evaluate each other's ideas and reasoning in ways that are not
critical of the sharer. Students should be expected to be active listeners who participate in discussion and feel a sense of responsibility for each other understands.

Teaching mathematics with a focus on number sense encourages students to become problem solvers in a wide variety of situations and to view mathematics as a discipline in which thinking is important. "Number sense" relates to having an intuitive feel for number size and combinations, and the ability to work flexibly with numbers in problem situations in order to make sound decisions and reasonable judgments. It involves mentally computing, estimating, sensing number magnitudes, moving between representation systems for numbers, and judging the reasonableness of numerical results. Markovits and Sowder (1994) studied seventh-grade classes where special units on number magnitude, mental computation and computational estimation were taught. They determined that after this special instruction, students were more likely to use strategies that reflected sound number sense, and that this was a long-lasting change. In a study of second graders, Cobb (1991) and his colleagues found that students' number sense was improved by a problem-centered curriculum that emphasized student interaction and self-generated solution methods. Almost every student developed a variety of strategies to solve a wide range of problems. Students also demonstrated increased persistence in solving problems. Moreover, differentiating instruction by varying content and instruction strategies will help students master content.

Differentiated instruction is a teaching philosophy based on the premise that teachers should adjust instruction to student differences. Rather than moving students through the curriculum in lockstep, teachers should modify their instruction to meet
students' varying readiness levels, learning preferences, and interests. Further, differentiated instruction allows all students to access the same classroom curriculum by providing entry points, learning tasks, and outcomes that are tailored to students' needs (Hall, Strangman, & Meyer, 2003). Ultimately, differentiated instruction is not a single strategy, but rather an approach to instruction that incorporates a variety of strategies.

Teachers rely on various strategies to enhance the effectiveness of their curriculum delivery; differentiation lends a hand. Teachers enhance learning by matching student characteristics to instruction and assessment and this allows students choice in outcomes. This is differentiation of process which refers to the way in which a student accesses material. One student may explore a learning center, while another student collects information from the web. As well, teachers who differentiate instruction rely on a number of strategies such as cooperative learning, multi-age grouping, and addressing multiple intelligence; all help makes differentiation feasible.

According to Tomlinson (1999), flexible grouping is essentially a must when differentiating instruction. If you don't use flexible grouping, it's almost impossible to differentiate instruction. Teachers can vary whole-class instruction by teaching small groups or individual students. In addition, students can be grouped based on readiness, interest, or learning profile and groups do not necessarily have to be homogeneous. A teacher might group students with a similar readiness level (e.g., for reading instruction) or with a dissimilar one (e.g., to discuss a book they all love). Indeed, another helpful strategy is using "tiered activities," where the teacher keeps the concepts and skills the same for all students but provides "routes of access" that vary in terms of complexity,
abstractness, and open-endedness. Other strategies include using stations, compacting, and agendas.

When teachers differentiate, they do so in response to a student’s readiness, interest, and/or learning profile. Readiness refers to the skill level and background knowledge of the child. Interest refers to topics that the student may want to explore or that will motivate the student. This can include interests relevant to the content area as well as outside interests of the student. Finally, a student’s learning profile includes learning style (i.e., a visual, auditory, tactile, or kinesthetic learner), grouping preferences (i.e., individual, small group, or large group), and environmental preferences (i.e., lots of space or a quiet area to work). A teacher may differentiate based on any one of these factors or any combination of factors (Tomlinson, 1999).

According to Tomlinson (2000), there is no contradiction between effective standards-based instruction and differentiation. Curriculum tells us what to teach: Differentiation tells us how. Thus, if we elect to teach a standards-based curriculum, differentiation simply suggests ways in which we can make that curriculum work best for varied learners. In other words, differentiation can show us how to teach the same standard to a range of learners by employing a variety of teaching and learning modes.

Choose any standard. Differentiation suggests that you can challenge all learners by providing materials and tasks on the standard at varied levels of difficulty, with varying degrees of scaffolding, through multiple instructional groups, and with time variations. Further, differentiation suggests that teachers can craft lessons in ways that tap into multiple student interests to promote heightened learner interest in the standard.
Teachers can encourage student success by varying ways in which students work: alone or collaboratively, in auditory or visual modes, or through practical or creative means.

Finally, teachers need to be able to scrutinize and reflect on their practice, to evaluate the effects of their teaching, and to refine and enhance their instruction. They must continuously evaluate what students are thinking and understanding and reshape their plans to take account of what they've discovered (Darling-Hammond, 1998). In spite of the best differentiated lessons, a teacher must have a classroom management system in place if differentiation is expected to be profitable.

Classroom Management and Level 1 Students

Classroom management affects students’ achievement and attitudes. It is the intent of this study to review classroom management in math classes and determine its impact on student math achievement. According to Marzano (2003), a teacher level-factor that affects student achievement is classroom management. Classroom management is on nearly every list of factors associated with student achievement, it is not a simple construct. Four integrated aspects of classroom management are identified: establishing and enforcing a comprehensive list of rules and procedures, using disciplinary interventions that strike a balance between positive reinforcement for appropriate behavior and negative consequences for inappropriate behavior, establishing relationships with students that involve appropriate levels of dominance and cooperation, and developing the mental disposition and emotional objectivity toward students. This is a primary goal of the teacher and must be completed and consistently monitored in order to make the necessary adjustments when needed.
Teachers must convey and enforce an all-inclusive set of classroom procedures and use specific strategies that reinforce suitable behavior if they expect to enhance math achievement. At the same time, teachers must recognize and provide consequences for inappropriate behavior; this behavior interferes with the curriculum delivery. Moreover, teachers must institute a school wide approach to discipline. A school-wide discipline policy does not preclude teachers from using individual strategies; however, it communicates powerfully to students and parents that teachers speak with one voice on how discipline should be addressed (Marzano, 2003).

Likewise, a balance of moderate authority and moderate cooperation in dealing with students can also assist teachers in managing the classroom and delivering instruction. In addition, administrators can provide teachers with an understanding of the needs of diverse types of students in a workshops or in-services. Likewise, administrators can give assistance with ways of alleviating certain student needs while at the same time, make use of specific strategies to sustain or intensify awareness regarding student actions. Finally, teachers may employ specific strategies that help them sustain healthy emotional objectivity with their students, which may be of assistance in setting expectations for an effective classroom management system (Marzano, 2003).

According to Darling-Hammond (1998), teachers need several kinds of knowledge about learning and classroom management. Teachers need to think about what it means to learn different kinds of material for different purposes and how to decide which kinds of learning are most necessary in different contexts. Teachers must be able to use different teaching strategies to accomplish various goals and many means
for evaluating students' knowledge and assessing students' approaches to learning.

Teachers must be able to identify the strengths of different learners while addressing their weaknesses. In addition, all teachers need tools to work with students who have specific learning disabilities or needs that may affect the management of the class.

Teachers need to know about curriculum resources and technologies to connect their students with sources of information and knowledge that allow them to explore ideas, acquire and synthesize information, and frame and solve problems that may arise to disrupt the orderly operation of the classroom. Also, teachers need to know about collaboration—how to structure interactions among students so that more powerful shared learning can occur; how to collaborate with other teachers; and how to work with parents to learn more about their children and to shape supportive experiences at school and home (Darling-Hammond, 1998). Once these avenues have been explored, even mastered, then teacher expectations will become embedded in the overall instructional program so that the class we be able to participate in all types of differentiated instruction while managing classroom.

Teacher Expectations and Level 1 Students

Today, we know more about teaching than we ever have before. Research has shown us that teachers' actions in their classrooms have twice the impact on student achievement as do school policies regarding curriculum, assessment, staff collegiality, and community involvement. Teacher expectations make a difference in student achievement. According to Marzano (2003), the way teacher expectations are communicated to students in classroom settings influence student outcomes. Teacher
expectations can and do affect students' achievement and attitudes. It is the intent of this study to review teacher expectations in math classes and determine their impact on student achievement.

Students need to know that teachers believe in them and what they are able to accomplish. In turn, students need to believe that they can accomplish learning goals. When students experience success, it builds self-efficacy. Efficacy is the belief by the learner, that he or she can do the task or learn the information. The belief is based, in part, on past experience. Hence, this is one of the reasons it is important that students experience success. Success really does breed success.

Self-efficacy differs from self-esteem in that self-esteem is a belief in oneself, while self-efficacy is a belief that we can do something because we have been successful before. Self-efficacy is more powerful because it is based on specific evidence from past experience. Students need to know what they did right and what they can improve. This is extremely important if we are to move students to high achievement (Tilesston, 2004). Self-efficacy is linked to teacher expectations and ultimately student achievement in students of all ages and socioeconomic backgrounds. What are the impacts of low teacher expectations on student from poverty?

We often see a sense of helplessness in students from poverty. The prevailing attitude, learned at an early age, is that the family has no control over their plight in life, which they cannot improve, and that poverty is their destiny. As Sprenger (2002) says, "Learned helplessness is a disorder in which cause and effect no longer connect to the child’s brain" (p. 116). Remember that helplessness is a learned condition; it is not
We can help students to rewire from learned helplessness to a sense of positive self-efficacy if we motivate students through positive teacher expectations.

Motivating students requires an understanding of what individual students believe about themselves, what they care about, and what tasks are likely to give them enough success to encourage them to work hard to learn (Darling-Hammond, 1998). Hence, teachers matter most in fostering student learning. Research has shown that in public schools, teacher quality has a greater effect on student learning than low levels of parental education, poverty, race, or other attributes believed to put children at risk. Researchers have concluded that students assigned to the most effective teachers three years in a row performed 50 percentile points higher than did their peers who had been assigned to the least effective teachers. Similar research done in Texas reached the same conclusion: having a high quality teacher throughout elementary school can substantially offset or even eliminate the disadvantage of low socioeconomic background (Carey, 2004). In due course, teacher expectations will affect student achievement; therefore, it is vital that teachers receive high-quality learning opportunities to improve their teaching.

*Site-based Professional Learning and Level 1 Students*

High-quality, employment-based training and learning opportunities are found in all professions. Consequently, teachers need opportunities for professional learning in order to absorb the latest and most promising practices while having an opportunity to learn from one another, especially master teachers who are coaches. Every teacher in every classroom should have an opportunity to participate in on-going professional learning programs. The attributes of such programs include extended duration of such
programs, clear purpose, flexibility, research based, collaboration, content specificity, and a rich context. Without professional learning and support, many teachers opt to leave. High teacher turnover in high-poverty schools and its consequences are unacceptable. Every student must have high-quality teachers, not merely the advantaged few, and districts must pursue policies that encourage the most effective teachers to work in the lower performing schools (Handley, 2001).

What kinds of preservice training and ongoing professional development will make teacher success more likely? According to Darling-Hammond (1998), *many* teachers start their careers in disadvantaged schools where turnover is highest, are assigned the most educationally needy students whom no one else wants to teach, are given the most demanding teaching loads with the greatest number of extra duties, and receive few curriculum materials and no mentoring. After this hazing, many leave. Others learn merely to cope rather than to teach well. After entry, teachers are expected to know everything they will need for a career, or to learn through workshops mostly on their own, with few structured opportunities to observe and analyze teaching with others. As one high school teacher who had spent 25 years in the classroom stated: "I have taught 20,000 classes; I have been 'evaluated' 30 times; but I have never seen another teacher teach." With this degree of isolation common, is it any wonder that shared knowledge and standards of practice are so difficult to forge. Professional development is essential.

Some school districts have begun to create new models of induction and ongoing professional development for teachers and principals. These feature mentoring for
beginners and veterans; peer observation and coaching; local study groups and networks for specific subject matter areas; teacher academies that provide ongoing seminars and courses of study tied to practice; and school-university partnerships that sponsor collaborative research, interschool visitations, and learning opportunities developed in response to teachers' and principals' felt needs. At its root, achieving high levels of student understanding requires immensely skillful teaching—and schools that are organized to support teachers' continuous learning (Darling, Hammond, 1998). With support programs in place, it is possible to recruit and retain high-quality teachers for level-one math students.

Further, many of these programs have joined with local school districts to create professional development schools. These schools aim to provide sites for state-of-the-art practice that are organized to support the training of new professionals, extend the professional development of veteran teachers, and sponsor collaborative research and inquiry. Both university and school faculty plan and teach in these programs. Beginning teachers get a more coherent learning experience when they are organized in teams with these faculties and with one another. Senior teachers deepen their knowledge by serving as mentors, adjunct faculty, co-researchers, and teacher leaders. Thus, these schools can help create the rub between theory and practice, while creating more professional roles for teachers and constructing knowledge that is more useful for both practice and ongoing theory building (Darling-Hammond 1994).

These new programs typically engage prospective teachers in studying research and conducting their own inquiries through cases, action research, and structured
reflections about practice. They envision the professional teacher as one who learns from
teaching rather than as one who has finished learning how to teach, and the job of teacher
education as developing the capacity to inquire systematically and sensitively into the
nature of learning and the effects of teaching.

Using data from a 50-state survey of policies, state case study analyses, the 1993-
94 Schools and Staffing Surveys (SASS), and the National Assessment of Educational
Progress (NAEP), this study examined the ways in which teacher qualifications and other
school inputs are related to student achievement across states. The findings of both the
qualitative and quantitative analyses suggest that policy investments in the quality of
teachers may be related to improvements in student performance. Quantitative analyses
indicate that measures of teacher preparation and certification are by far the strongest
correlates of student achievement in reading and mathematics, both before and after
controlling for student poverty and language status. State policy surveys and case study
data are used to evaluate policies that influence the overall level of teacher qualifications
within and across states. This analysis suggests that policies adopted by states regarding
teacher education, licensing, hiring, and professional development may make an
important difference in the qualifications and capacities that teachers bring to their work
(Darling-Hammond, 2000).

Creating a profession of teaching in which teachers have the opportunity for
continual learning is the likeliest way to inspire greater achievement for children,
especially those for whom education is the only pathway to survival and success.
Problem Statement

The metropolitan Atlanta school district used in this study has an enrollment of 102,000 students and it experiences a gap between sixth, seventh and eighth grade math achievement on the CRCT from school year 2003-2006. Table 1 illustrates the percentages of middle grade students who did not meet (Level 1-below 800), met (Level 2-800-849) and exceeded (Level 3-850+) on the Criterion Reference Competency Test (CRCT) in school year 2006-2007. The outcome of Level 1 percentages, (below 800) in mathematics reveals a need for this study.

Table 1

*Metro Atlanta School System CRCT Math Percentages in Grades 6-8 in SY 2006-2007*

<table>
<thead>
<tr>
<th>2006 – 2007</th>
<th>All Students</th>
<th>Black</th>
<th>White</th>
<th>Male</th>
<th>Female</th>
<th>Economically Disadvantaged</th>
<th>Economically Disadvantaged</th>
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<td>6th Grade Students</td>
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<td>5,705</td>
<td>634</td>
<td>3,734</td>
<td>3,534</td>
<td>4,674</td>
<td>2,637</td>
</tr>
<tr>
<td>%</td>
<td>49</td>
<td>53</td>
<td>17</td>
<td>54</td>
<td>45</td>
<td>57</td>
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<tr>
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<td>609</td>
<td>3,869</td>
<td>3,716</td>
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<tr>
<td>%</td>
<td>30</td>
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Table 1 (continued)

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<tr>
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<tr>
<td>8th Grade Students</td>
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</table>

Table 2 illustrates the percentages of middle grade students who did not meet standards (Level 1), on the Criterion Reference Competency Test (CRCT) in school years 2003-2006. The end result of Level 1 percentage, (students who did not meet standards) in mathematics also brings to light a need for this study.
Table 2

*Metro Atlanta School Level 1 Math Percentages from 2003-2005.*

<table>
<thead>
<tr>
<th></th>
<th>2005-2006</th>
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<th>2004-2005</th>
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<td>8&lt;sup&gt;th&lt;/sup&gt; Grade</td>
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<tr>
<td></td>
<td>Level 1 %</td>
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<td>Level 1 %</td>
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<tr>
<td>All students</td>
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<td>Female</td>
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<tr>
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<td>Disadvantaged</td>
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<tr>
<td>Not</td>
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<td></td>
<td>Level 1 %</td>
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<td>Level 1 %</td>
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<tr>
<td>All students</td>
<td>37</td>
<td></td>
<td>31</td>
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<tr>
<td>Black</td>
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<tr>
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<td>Economically</td>
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<td>Disadvantaged</td>
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<td>Disadvantaged</td>
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This study examines the extent to which student achievement in mathematics at the middle school level in a metropolitan Atlanta school district may be explained by certain school and teacher related variables such as instructional strategies, classroom management, teacher expectations, site-based professional learning, and teacher satisfaction with resources and how these factors might impact or cause a difference in student achievement in math as measured by the 2007 CRCT scores.

Purpose of the Study

This study examines the extent to which student achievement in mathematics at the middle school level in a metropolitan Atlanta school district may be explained by certain school and teacher related variables such as instructional strategies, classroom management, teacher expectations, site-based professional learning, and teacher satisfaction with resources and how these factors might impact or cause a difference in student achievement in math as measured by the 2007 CRCT scores.

Significance of the Study

Rationale

This study examines the extent to which student achievement in mathematics at the middle school level in a metropolitan Atlanta school district may be explained by certain school and teacher related variables such as instructional strategies, classroom management, teacher expectations, site-based professional learning, and teacher satisfaction with resources and how these factors might impact or cause a difference in student achievement in math as measured by the 2007 CRCT scores.
There is increasing but complex evidence concerning the different educational pathways accorded students through assignments to ability based instructional groups in middle school that often reflect teacher judgments about mathematical ability of low-income minority students. This study will be significant in the assistance that it can give administrators in structuring site-based professional learning and development programs along with arranging for monitoring and communication methods that will meet the needs of teachers and students. Additionally, this research will add to a body of scholarship and may cause individuals to examine and put into place, or remove certain policies. As a final point, this research will determine the need for additional research.

Schools are expected to meet Adequate Yearly Progress (AYP) and test at least 95% of all students in grades three through eight on the CRCT or Georgia Alternative Assessment (GAA). Schools are also expected to achieve an Annual Measurable Objectives (AMO) Target of 66.7% for CRCT Math (through Spring 2011) at the all students’ level and for each applicable subgroup. Further, schools are expected to achieve Annual Measurable Objective target of 68.6% for E-GHSGT for Math (through Spring 2007) at the all students’ level and for each applicable subgroup. This illustrates the importance of improving math achievement in middle grades.

In Grades 3-8, schools must meet the second indicator (Attendance) by ensuring that no more than 15% of students are absent 15 days or more or demonstrate an improvement in attendance. Attendance data is based on any student enrolled during the school year for any duration. This second indicator is applicable to the ALL student group (the school as a whole). However, any subgroup that makes AMO via Safe Harbor
then must meet the criteria for the second indicator as a subgroup. Factors that contribute to student achievement on these assessments are: instructional strategies, classroom management, teacher expectation, site-based professional learning, and teacher satisfaction with resources; these factors are examined in this study.
CHAPTER II
REVIEW OF THE LITERATURE

The intent of this chapter is to review relevant literature related to the independent variables of the study and the dependent variable, student achievement. This study examines the extent to which student achievement in mathematics at the middle school level in a metropolitan Atlanta school district may be explained by certain school and teacher related variables such as instructional strategies, classroom management, teacher expectations, site-based professional learning, and teacher satisfaction with resources and how these factors might impact or cause a difference in student achievement in math as measured by the 2007 CRCT scores.

In addition, this chapter highlights important studies related to the factors that affect student achievement and low-income minority children. The literature was reviewed under the following headings: instructional strategies, classroom management, teacher expectations, site-based professional learning, and teacher satisfaction with resources.

Instructional Strategies

Use of various instructional strategies is a major contribution to student achievement. When students discover mathematical ideas and invent mathematical procedures, they have a stronger conceptual understanding of connections between mathematical ideas. One reason so many students do not do well in the math classroom
is that they are taught and re-taught in the same way. In order to teach all students, teachers must employ more than one teaching method for teaching new material and re-teaching material students did not master. According to Tileston (2004), information must be reinforced through the students’ preferred learning modality. Information enters the brain through the senses. Most of us have a modality in which we prefer to receive information. When we are taught in that modality, we are more comfortable, and we have a better flow state.

For visual learners, (oftentimes the largest number of students in the classroom), being able to see how the math works, or visually seeing the learning in some way, helps them to be convinced that they know it. If one is teaching students who did not “get it” the first time, one will probably not reach them until they are taught in their preferred learning modality. Teachers who do not make use of a variety of instructional strategies will face challenges in increasing student achievement (Tileston, 2004).

Reporting on their analysis of achievement scores from five subject areas (mathematics, reading, language arts, social studies, and science) for some 60,000 students across grades 3 through 5 elementary students in Tennessee, Wright, Horn, and Sanders (1997) note that the most important factor affecting student learning is the teacher. In addition, the results of their study show wide variation in effectiveness among teachers. The immediate and clear implication of this finding is that seemingly more can be done to improve education by improving the effectiveness of its teachers. This study illustrates the impact of an individual teacher on student achievement.
Based on research conducted by the University of Central Florida (UCF), immersive educational video games can improve students' math skills and comprehension and raise scores on district-wide benchmark exams. According to the study, over an 18-week period, students playing the educational video games demonstrated higher gains on district benchmark exams than students not playing the games. On average, students in the experimental group made gains of 8.07 points (out of 25), while students in the control group made gains of 3.74 points.

The study, conducted by a team of faculty and graduate students at the university, consisted of 193 algebra and pre-algebra students and 10 teachers, all from Orange County, Florida. Experimental and control groups were used to test the researchers' hypotheses and were evaluated using pre- and post-study district benchmark exams, game preparation tests, surveys, classroom observations, and personal interviews. In addition to increased test scores, researchers found that teacher training, as well as focusing on the integration of games was essential to enhancing student learning. They also found that students were not only capable of figuring out game-play on their own, but were also willing to help fellow classmates with the game mechanics.

Research in urban education suggests that much of the curriculum development conducted in schools is driven by the belief that certain skills are "basic" and must be mastered before students can go on to achieve more "advanced" skills such as reading comprehension, written composition, and mathematical reasoning. The result is that many students, particularly those who are deemed to be "at risk," receive instruction centered on basics such as phonetic decoding and arithmetic operations to the exclusion
of reasoning activities, reading for meaning, and written communication (Means, Chelemer, & Knapp, 1991).

Research in cognitive science suggests that educators should discard old assumptions about how children think and process new information and view children's competencies as evolving both within and outside of the schools. Such a model contends that teachers should start with what students know and use this knowledge as a beginning point in providing educational experiences. It also is based on the belief that students possess the capacity to engage in higher-order thinking.

Similar concerns about the curriculum and pedagogy employed in urban schools were described in an article entitled "The Pedagogy of Poverty Versus Good Teaching" (Haberman, 1991). The author states that the following set of teaching acts constitutes the core functions of urban teaching: giving information, directions, tests, asking questions, making assignments, monitoring seat work, reviewing assignments, tests, homework, assigning homework, settling disputes, punishing noncompliance, marking papers and giving grades.

According to Haberman (1991), any one of these 14 acts might have a beneficial effect. However, when performed to the systematic exclusion of other acts, they constitute" pedagogy of poverty" that is predicated upon four syllogisms:

- Teaching is what teachers do. Learning is what students do. Therefore, students and teachers are engaged in different activities.
• Teachers are in charge and responsible. Students are people who still need to develop appropriate behavior. Therefore, when students follow teachers’ directions, appropriate behavior is being taught and learned.

• Students represent a wide range of individual differences. Many students have handicapping conditions and lead debilitating home lives. Therefore, ranking of some sort is inevitable; some students will end up at the bottom of the class while others will finish at the top.

• Basic skills are a prerequisite for learning and living. Students are not necessarily interested in basic skills. Therefore, directive pedagogy must be used to ensure that youngsters are compelled to learn their basic skills. (p. 3)

There is definitely a need to differentiate instruction.

Tomlinson (2000) states that math teachers in one small district, in a high school Algebra II class, the teacher acknowledged that some of her students lacked prerequisite skills, whereas others learned as rapidly as she could teach or even without her help. At the outset of each chapter, the teacher delineated for students the specific skills, concepts, and understandings that they needed to master for that segment of the curriculum—both to have a solid grasp of mathematics and to pass the upcoming standards exam. She helped students make connections to past concepts, understandings, and skills. She divided each week into segments of teacher-led instruction, whole-class instruction, and small-group work.

For group-work sessions, she sometimes met with students who were advanced in a particular topic to urge on their thinking, to help them solve problems in multiple ways,
and to apply their understandings and skills to complex, real-life problems. Sometimes she met with students who needed additional instruction or guided assistance in applying what they were learning. Sometimes she created mixed-readiness teams of students whose goal was solving a problem in the most effective way possible. The teacher randomly called on students to present and defend their team's approach, thus maximizing the likelihood that every student had a model for solving an important problem and was able to explain the reasoning behind the solution. These problem-solving groups often evolved into teacher-created study groups that worked together to ensure that everyone had his or her questions answered. Not only did the teacher provide some class time for the study groups, but she also encouraged regular after-school meetings in her room, where she was able to monitor group progress and assist if needed. She recalls:

The hardest thing for me was learning to teach a class where I was not always working with the class as a whole, but that has been rewarding, too. I know my students better. They know Algebra II better—and I think I probably understand it better, too. I haven't made a math prodigy out of everyone, of course, but I can honestly say the students like algebra better and are more confident in their capacity to learn. Their scores on the standards test improved, even though I targeted some ideas and skills more than others. I think what that fact tells me is that if I help students organize their mathematical knowledge and thinking; they can fare better in unfamiliar territory.
In an elementary classroom, a teacher organized many of her standards around three key concepts—connections, environments, and change—and their related principles; for example, living things are changed by and change their environments. She used them to study history, science, language arts, and sometimes mathematics. Although she generally taught each of the three subjects separately, she helped students make links among them; she created activities for the students that called for reading skills in social studies, for example, and social studies skills in science. That approach, she said, allowed everyone to work with the same big ideas and skills in a lesson while she could adjust materials, activities, and projects for varied readiness levels, diverse interests, and multiple modes of learning. Bringing the students together for class discussions was no problem, she reflected, because everyone's work focused on the essentials—even though students might get to those essentials in different ways. "It took me some time to rethink the standards and how I taught them," she recalled.

But I feel as if I'm a better teacher. I understand what I'm teaching better, and I certainly have come to understand the students I teach more fully. I no longer see my curriculum as a list to be covered, and I no longer see my students as duplicates of one another.

In these settings, teachers have retained—or, in some cases, have discovered for the first time—the essential frameworks of the disciplines and the coherence, understanding, purpose, and joy in learning. The teachers have struggled to meet their first obligation—to ensure that standards-based teaching practice is not in conflict with
best teaching practice. Once the teachers aligned standards with high-quality instruction, differentiation followed naturally.

There are two theoretical models that provide the foundation for differentiated instruction: the principle of Blooms Taxonomy and Gardner’s multiple intelligences. These principles are utilized by Heacox (2002) as a lens in which to focus the foundations of differentiated instruction. Further, the McREL study as reported by Marzano (1998) shows that using organizers in general will raise the student achievement for the given learning from the 50th percentile to the 72nd percentile. It is significant when we take a student from nonachievement (50th percentile) to an acceptable achievement (77th percentile) by adding visual organizers.

Using small groups of students to work on activities, problems and assignments can increase student mathematics achievement. Davidson (1985) reviewed studies that compared student achievement in small group settings with traditional whole-class instruction. In more than 40% of these studies, students in the classes using small group approaches significantly outscored control students on measures of student performance. In only two of the 79 studies did control-group students perform better than the small group students, and in these studies there were some design irregularities. From a review of 99 studies of cooperative group-learning methods, Slavin (1990) concluded that cooperative methods were effective in improving student achievement. The most effective methods emphasized both group goals and individual accountability.

Long-term use of concrete materials is positively related to increases in student mathematics achievement and improved attitudes towards mathematics. In a review of
activity-based learning in mathematics in kindergarten through grade 8, Suydam and Higgins (1977) concluded that using manipulative materials produces greater achievement gains than not using them. In a more recent meta-analysis of 60 studies (kindergarten through postsecondary) that compared the effects of using concrete materials with the effects of more abstract instruction, Sowell (1989) found that the long-term use of concrete materials by teachers knowledgeable in their use improved student achievement and attitudes.

Using calculators in the learning of mathematics can result in increased achievement and improved student attitudes. Studies have consistently shown that thoughtful use of calculators improves student mathematics achievement and attitudes toward mathematics. From a meta-analysis of 79 non-graphing calculator studies, Hembree and Dessart (1986) concluded that use of hand-held calculators improved student learning. Analysis also showed that students using calculators tended to have better attitudes towards mathematics and better self-concepts in mathematics than their counterparts who did not use calculators. They also found that there was no loss in student ability to perform paper-and-pencil computational skills when calculators were used as part of mathematics instruction.

Research on the use of graphing calculators has also shown positive effects on student achievement. Most studies have found positive effects on students' graphing ability, conceptual understanding of graphs and their ability to relate graphical representations to other representations. Most studies of graphing calculators have found no negative effect on basic skills, factual knowledge, or computational skills.
Classroom Management

One of the classroom teacher's most important jobs is managing the classroom effectively. A comprehensive literature review by Wang, Haertel, and Walberg (1993) amply demonstrates the importance of effective classroom management. These researchers analyzed 86 chapters from annual research reviews, 44 handbook chapters, 20 government and commissioned reports, and 11 journal articles to produce a list of 222 variables affecting student achievement. They combined the results of these analyses with the findings from 134 separate meta-analyses. Of all of the variables, classroom management had the largest effect on student achievement. This makes intuitive sense—students cannot learn in a chaotic, poorly managed classroom.

Walter Doyle (1986) defines classroom management as "covering a wide range of teacher duties from distributing resources to students, accounting for student attendance, and school property, enforcing compliance with rules and procedures to grouping students for instruction . . ." (p. 394). Jere Brophy (1996) defines classroom management as . . ."actions taken to create and maintain a learning environment conducive to successful instruction (arranging the physical environment of the classroom, establishing rules and procedures, maintaining attention to lessons and engagement in academic activities" (p. 5). Marzano (2003) defines classroom management as the joining together of teacher actions in four distinct areas: (a) establishing and enforcing rules and procedures, (b) carrying out discipline, (c) maintaining effective teacher and student relationships, and (d) maintaining an appropriate mental set for management.
Different classrooms will have different rules and procedures depending on the needs and dispositions of the teacher and the students. However, in general, rules and procedures are commonly established for the following areas: general expectations for behavior; beginning and ending class, transitions and interruptions, materials and equipment, group work, and seatwork, as well as teacher-led activities.

One of the more hotly debated aspects of classroom management is discipline. Some appear to hold the position that disciplinary actions in almost any form are not only ineffective but counterproductive for student achievement. Alfi Kohn (1993, 1996), for example, has articulated this sentiment in a series of works. Although Kohn makes some useful points about appropriate use of discipline and over-reliance on punishment, the categorical rejection of disciplinary techniques is simply not supported by research. Quite the contrary, the research strongly supports a balanced approach that employs a variety of techniques.

To illustrate, a meta-analysis by Scott Stage and David Quiroz (1997) included more than 99 studies, 200 experimental comparisons, and 5,000 students. Their overall finding was that the “interventions analyzed in this study resulted, on the average, in reduction of disruption classroom behavior among 78% of the treated subjects” (p. 356). Four of the categories of disciplinary techniques they identified are particularly relevant: (a) reinforcement, (b) punishment, (c) no immediate consequences, and (d) combined punishment and reinforcement.

An effective relationship may be the keystone that allows the other aspects to work well. If a teacher has good relationships with students, then students accept her
rules, procedures, and disciplinary actions. Without the foundation of a good relationship, students commonly contest them. What constitutes a good relationship between teachers and students? At least two major research efforts have focused on this dynamic either directly or indirectly.

Jere Brophy conducted the most ambitious study to this end, commonly referred to as the Classroom Strategy Study (Brophy, 1996; Brophy & McClasín, 1992). This study involved in-depth interviews with and observations of 98 teachers; some were identified as effective managers and some were not. The heart of the study involved presenting teacher with vignettes regarding specific types of students (e.g., hostile-aggressive students, passive-aggressive students, hyperactive students) in specific situations. Among the many findings, the most effective classroom managers tended to employ different types of strategies with different types of students, whereas ineffective managers did not. Effective managers do not treat all students the same, particularly in situations involving behavior problems. Were some students need encouragement, other students need a gentle reminder, and still others require a firm reprimand. In fact, Brophy (1996) strongly recommended teachers develop a set of “helping skills” to employ with different types of students.

Research not only supports the importance of classroom management, but it also sheds light on the dynamics of classroom management. Stage and Quiroz’s (1997) meta-analysis shows the importance of there being a balance between teachers actions that provide clear consequences for unacceptable behavior and teacher actions that recognize
and reward acceptable behavior. In addition to creating a productive climate conducive to teaching and learning, teachers are responsible for student achievement.

Effective classroom managers are aware of important differences among students and are easy to spot because they have characteristics that lead students to become good self-managers. About 98% of the behaviors in the classroom are identified as simple off-task behavior. While the problem can be considered minor in terms of today’s kids, the amount to lost learning time is not minor. Likewise, Jensen (1997) says that most so-called behavior problems in the classroom are not really behavior problems, but simply off-task behavior as a result of problems with learning. When we do not see the relevance in the learning, are bored, or have high anxiety over the materials, we tend to drop out mentally. In order for students to attend to learning they must be (a) intrinsically motivated, (b) be in an immerse flow state, and (c) have low stress.

Specifically, in a recent meta-analysis involving over 2,5000 effect sizes, instructional strategies were analyzed as to which of the systems of the brain have the greatest impact on learning. For example, if an instructional strategy addressed student beliefs and attitudes, it was coded as employing the self-system. If an instructional technique addressed the establishment of goals, it was coded as employing the metacognitive system. Finally, if the instructional technique addressed the analysis of information, it was coded as employing the cognitive system (Marzano, Pickering, & Pollock, 2001).

Of these three systems, it was found that the self-system had the greatest effect on student success. In fact, the self-system, when used appropriately, can raise the learning
level of a student from the 50th percentile to the 77th percentile. The metacognitive system was second (76th percentile), and the cognitive system was the last in terms of effect size (71st percentile). Sometimes, behavior problems go beyond the simply off-task variety and must be addressed immediately. When that occurs, it is important that the teacher respond appropriately, in voice and in body language to get the student back on task as quickly as possible. Identifying the differences helps the teacher better understand individual students and leads students to believe that the teacher has a personal interest in them (Tileston, 2004).

Curwin and Mendler (1988) define the models of the past as obedience models because they were built on teachers’ gaining power over students through intimidation and punishment in order to coerce obedience offers teachers relief, a sense of power and control, and an oasis from the constant bombardment of defiance. In the long run, however, obedience leads to immaturity, a lack of responsibility, and an inability to think clearly and critically, and a feeling of helplessness that is manifested by withdrawal, aggressiveness, or power struggles. Not getting caught supersedes everything else in the game of teacher versus student. Students should know in advanced, our expectations in terms of both academics and behaviors. To the extent possible, rules should be kept brief, written in the positive, and displayed in the classroom. Most importantly, the expected behaviors should fit the situation. The more teachers and administrators can come to a consensus on behavior expectations for the school, the smoother the transitions will be in the entire building (Bruke, 1992).
Teacher Expectations

Beginning with *Pygmalion in the Classroom* (Rosenthal & Jacobson, 1968), an extensive body of research has been developed that describes how teachers' expectations can influence student performance. While it would be misleading and inaccurate to state that teacher expectations determine a student's success, the research clearly establishes that teacher expectations do play a significant role in determining how well and how much students learn.

Although "teacher expectations" has many definitions, this research concentrates on three general types (Cooper, 1984). The first refers to the teacher's perceptions of where a student is "at the present moment." While not really a statement about expectations of future performance, it does help identify expectation effects. For instance, it has been noted that teachers who believe that they are interacting with bright students smile and nod their heads more often than teachers who believe that they are interacting with slow students. Teachers also lean toward and look into the eyes of smarter students more frequently (Chaikin, Sigler, & Derlega, 1974). Behaviors such as these are predicated upon how the teacher "perceived" the student initially.

The second type of expectation involves a teacher's prediction about how much academic progress a student will make over a specified period of time. It appears that "expected" improvement is only weakly correlated with a teacher's present assessment of the student. However, Beez (1968) found that students labeled "slow" may receive fewer opportunities to learn new material than students labeled "bright" and that slow students
typically are taught less difficult material. The effect of such behavior is cumulative, and, over time, teachers' predictions of student achievement may in fact become true.

The third type of expectation is the degree to which a teacher over- or underestimates a student's present level of performance. This type of expectation results from a teacher's estimate of student ability based upon some formal assessment of that student's performance. It is most often driven by the use of a test that is perceived to provide an accurate measure of student ability.

The types of expectations described above result in two "effects" upon student performance. The first is called the self-fulfilling prophecy or the Pygmalion Effect. The second is called the sustaining expectation effect.

*The Pygmalion Effect*

Research into the ways in which teachers interact with their students and the relationship between those interactions and students' academic performance (Brophy & Good, 1974) considerable light on how teachers form expectations about their students and, more important, how teachers' expectations influence their behavior toward their students. Particularly noteworthy are the findings of Douglass (1964) and Mackler (1969), which are summarized as follows:

Teachers' expectations about a student's achievement can be affected by factors having little or nothing to do with his or her ability, and yet these expectations can determine the level of achievement by confining learning opportunities to those available in one's track. (p. 12)
One should not ignore the importance of these findings, particularly in light of the evidence that the student often internalizes teachers' expectations over time. When this internalization occurs, the student's self-concept and motivation to achieve may decline over time until the student's ability to achieve to his or her potential is damaged.

*Teacher Expectations and Student Achievement: The Evidence*

During spring 1992, the Center for Effective Schools (CES) at the University of Washington surveyed the staff of 87 elementary and secondary schools in four urban school districts (Chicago, Detroit, Indianapolis, and Milwaukee) as part of the data collection activities of the Academy for Urban School Leaders, which was sponsored by the North Central Regional Educational Laboratory (NCREL). The surveys, based on CES research, were designed to assess staff perceptions of their school on nine school variables (instructional leadership of the principal, staff dedication, high expectations for student achievement, frequent monitoring of student progress, and early identification of students with special learning needs, positive learning climate, multicultural education, and sex equity). The survey results on the high expectations for student achievement variable indicated that a large percentage of the 2,378 teachers who responded did not have high expectations for the academic achievement of students in their schools.

One of the most significant issues confronting public education in the United States today is the lack of understanding about standardized tests and the appropriateness of their use in placing students in academic programs. Contributing to this misuse is the persistent belief that norm-referenced standardized achievement tests are an accurate gauge of a student's potential to learn.
The fundamental assumption underlying the use of such tests is that intelligence is stable and unchanging, rather than dynamic and malleable. In the United States, the testing community has historically embraced the view that intelligence is fixed and that through the administration of such tests it is possible to rank subjects accurately into categories such as gifted, average, and retarded (Hilliard, 1988).

A second factor that often contributes to teachers' low expectations for their students is an emphasis on ability rather than effort in assessing the academic potential of students. How our society has confused these concepts is clearly described in The Learning Gap (Stevenson & Stigler, 1992).

The authors compared Japanese and Chinese educational practices with those found in the United States. They found that people in the two Asian countries acknowledged differences in individuals' innate abilities (no one would claim that all people are born with the same abilities), but considered hard work to be a more important factor than ability in students' academic achievement. In contrast, American children, teachers, and parents emphasized innate abilities as the major component of academic success.

The result is that for many American students the preoccupation with innate ability has resulted in a belief tantamount to "educational predestination." That is, innate ability—rather than effort, the amount and quality of instruction, and parental involvement—is believed to be the key to academic success (Walberg, 1988).
Teacher Efficacy

One important factor contributing to low teacher expectations for students is the level of expectations that teachers have for their own performance. For instance, one of the difficulties that teachers confront is that the number of important goals that they can pursue exceeds the number they can accomplish within their available time and energy. To survive, many teachers simplify the problem by concentrating their efforts on the goals that they deem most important.

However, once the classroom door is closed, the goals that teachers actually act upon are often very different from the goals that they espouse, which leads to important differences in student achievement. In practice, this means that despite rhetoric implying a commitment to student achievement, some teachers emphasize "survival and convenience" goals, passing time in ways that are as pleasant as possible for themselves and their students. When such a bargain is "struck," the result is a compromised curriculum (Sedlak, Wheeler, Pullin, & Cusick, 1986; Powell, Farrar, & Cohen, 1985). At the other extreme are teachers who do not clearly focus upon any goals and try to accomplish everything that everyone wants. Unfortunately, the net result of such efforts is that they, too, accomplish very little of substance.

A major component of teacher efficacy is the issue of classroom control. In many urban schools, teachers experience a significant frustration about the gap between their expectations for students and the nature of the interactions that occur. Consequently, many teachers engage in classroom management practices in order to gain control over their students, even when they know that such behavior decreases students' opportunities
to learn. Such a decision often leads to an internal conflict and a resulting lack of efficacy within the student. This result creates a dichotomy between behavior that enhances teachers' feelings of control while decreasing the students' responsibility for their own learning and behavior that reflects good pedagogy while decreasing teachers' feelings of control. Such a conflict is intensified if the teacher works in a school that values order and control over the academic achievement of its students.

Hilliard (1991) states that just as there is a vast untapped potential, yes, genius, among the children, there is also a vast untapped potential among the teachers who serve children. He believes that the intellectual and professional potential of teachers has been drastically underestimated by the education community as a result of the same mindset that has caused teachers to underestimate the intellectual potential of their students. The way teacher expectations are communicated to students in classroom settings influence student outcomes. Teacher expectation can and do affect students achievement and attitudes. Among the researchers that address this topic, all found relationships between expectations and student outcomes. It is the intent of this study to review teacher expectations in math classes and determine their impact on student achievement.

Efficacy is the belief by the learner, that he or she can do the task or learn the information. The belief is based, in part, on past experience. This is one of the reasons it is important that students experience success. Because it builds self-efficacy in students, success really does breed success. Self-efficacy differs from self-esteem in that self esteem is a belief in oneself, while self-efficacy is a belief that we can do something because we have been successful before. Self-efficacy is more powerful because it is
based on specific evidence from past experience. Students need to know what they did right and upon what they can improve. This is extremely important if we are to move student to high achievement (Tileston, 2004).

Often there is a sense of helplessness in students from poverty. The prevailing attitude, learned at an early age, is that the family has no control over their plight in life, which they cannot improve, and that poverty is their destiny. Sprenger (2002) says, “Learned helplessness is a disorder in which cause and effect no longer connect to the child’s brain” (p. 116). Remember that helplessness is a learned condition; it is not genetic. Teachers can help students to rewire from learned helplessness to a sense of positive self-efficacy. Jensen (1997) suggests that the teacher begin with an easy task and continue to upgrade until the task is challenging and the stress level is moderate or low. Teachers depend on our teachers to manage the classes effectively and provide the scaffolding necessary to tackle difficult tasks.

Teacher expectations for ethnic minority children from lower socioeconomic groups are generally lower than those for other children. Studies in which achievement differences among students have been controlled show that those lowered expectations may reflect basis (Dusek & Joseph, 1983). There exists consistent empirical support for the teacher expectancy effects on student performance, both under experimental conditions and in naturalistic studies. Some researcher’s suggests that the largest effects are student driven rather than teacher driven and that expectancy effects resulting from bias in perceptions are relatively small, accounting for only about 5-10% of the variance in student achievement. Other studies predict a predictive rather than influential pathway
given the substantial correlation between teacher's expectations and children's previous achievement.

Site-based Professional Learning

Virtually every effort to improve the quality of education since the publication of *A Nation at Risk* in 1983 has focused on overcoming deficits in student knowledge or on reshaping the structure and organization of schooling. These reforms—ranging from encouraging more students to take harder courses to establishing charter and voucher schools, from testing and holding schools accountable to lowering class size, and from raising student self esteem to creating schools within schools—all have largely left the classroom untouched.

Despite a decade and a half of reform talk, teachers mostly continue to teach as they have in the past. In the absence of substantial professional development and training, many teachers naturally gravitate to the familiar methods they remember from their own years as students. For instance, a 1998 study from the National Center for Education Statistics (NCES) found that only a little more than half of teachers say they are using instructional strategies aligned with high standards (56%) and assisting all students to achieve (52%) (NCES, 1998). Moreover these percentages are almost certainly inflated. A videotape study of eighth grade mathematics teachers conducted as part of the Third International Mathematics and Science Study found that most teachers, even those who say they use reform methods, still teach with traditional practices (Stigler, Gonzales, Kawanaka, Knoll, & Serrano, 1999). In short, a school may be state-of-the-art charter, voucher-supported, magnet, or even school-within-a-school without
greatly affecting the teaching that takes place inside the classroom. As a result, student achievement for most has remained stagnant, even as society’s expectations for graduates rose.

All too often, in their zeal for visible reforms, educational leaders, policymakers, and the public have avoided the crucial role played by the teacher. Assuming that teachers are interchangeable parts whose knowledge and abilities do not matter, they search for the right organization that would make schools work regardless of what teachers do. A few programs try to minimize the role of the teacher, producing "teacher-proof" materials and prepackaged lessons that spell out everything the teacher is to say and do. When people do pay attention to teachers, it is usually to demand the use of teacher testing to target low scorers for dismissal or the abolishment of tenure so principals can fire "inferior" teachers.

In reality, a growing body of research shows that improving teacher knowledge and teaching skills is essential to raising student performance. Students spend the vast majority of their time in school either interacting in some way with teachers or working under teachers’ direction. Naturally enough, what teachers know and can do directly affects the quality of student learning. Other reforms—from smaller classes to charters to testing—are effective only to the degree that they affect what goes on behind the classroom door.

America’s recent push to reform the schools has created high standards, rigorous tests, and strict accountability measures in the hopes that these would force schools to improve the education they provide students. Supporters of these plans postulate that
schools and teachers already know what to do but simply need to work harder and demand more from students. Many states have already reached the limits of this strategy; they can align curriculum to standards and tests but ultimately improvements come down to how well teachers understand the standards and instructional techniques to reach all students. If states want teachers to radically change their results to get all students achieving, they must give teachers the tools, support, and training to radically change their practice (Hammond, 2006).

America cannot climb past its current achievement plateau without educating teachers, administrators, and other educators on what they need to do to reach the higher levels. Therefore, to improve the education we provide our children, our nation must improve the ongoing professional development it provides teachers and create a national plan for helping teachers fulfill their untapped potential. We can no longer hope that a random selection of courses and consultants will provide teachers with the knowledge and teaching techniques they need to bring all students to higher standards. Improving American education requires creating an organized staff development plan to upgrade the quality of teaching by keeping all educators, and all those who support these educators, learning throughout their careers (Hammond, 2005).

*Quality Professional Development Can Raise Student Achievement*

Acting on an assumption that great teachers are born, not made, our schools frequently hire unqualified and under trained teachers after they have taken just a short summer course. Studies show that nearly a quarter of newly hired American teachers lack the qualifications for their job and more than 40 states allow districts to hire teachers
who have not met basic requirements (NCTAF, 1996). It is therefore not surprising that schools do not recognize the importance of investing in quality teaching and supporting teacher learning. But ignoring ways to help teachers develop their skills and knowledge ignores the critical link between student performance and teaching; not surprisingly, studies show that students with better teachers learn more.

A Texas study of 900 districts conducted by Ronald Ferguson of Harvard University found that teacher expertise (as measured by teacher education, licensing examination scores, and experience) explains 40% of the difference in student achievement in reading and mathematics. Teacher quality explains most of the gap in achievement between African-American and white students (after controlling for socioeconomic status). Ferguson’s study also reveals how teacher quality can be improved; every dollar spent on more highly qualified teachers produced greater increases in student achievement than a dollar spent on any other single program (NCES, 1997 citing Ferguson, 1991).

Similarly, a Boston study by Bain and Company found that students of the top-third teachers produced gains on math tests that exceeded the national median while the bottom third showed virtually no growth. A study of schools in New York City found that differences in teacher qualifications accounted for 90% of the variation in student achievement in reading and mathematics (Armour-Thomas, Clay, Domanico, Bruno, & Allen, 1989). The evidence showing the influence of quality teachers is so overwhelming that the National Commission on Teaching and America’s Future (NCTAF) called for a nationwide commitment to provide every child with a caring and competent teacher.
(NCTAF, 1996). Even Eric Hanushek (as cited in Haycock, 1999), the University of Rochester economist who frequently writes that school spending does not have much impact on student achievement, admits that the difference between a good teacher and a bad teacher can be a full level of achievement in a single year.

By taking the more than three million teachers already in schools and helping them become more effective, staff development can produce immediate gains in teacher quality. For example, a 1998 study by David Cohen and Heather Hill at the University of Michigan found a relationship between teacher participation in curriculum workshops and scores on California’s state assessment, even when controlling for teachers’ past learning. Sustained participation in professional development activities tied to California’s elementary school mathematics curriculum successfully improved teachers’ knowledge of mathematics and their ability to transfer this knowledge to students. This effect was even higher when the professional development included information about the test (Cohen & Hill, 1998). The National School Boards Foundation even called investment in teacher learning the primary policy lever that school boards have to raise student achievement (National School Boards Foundation, 1999).

A study from NCES found that teachers who attended professional development activities focused on standards were much more likely to teach using reform activities that raise students’ achievement. Nearly two-thirds (65%) of teachers with the professional development reported that they used three or more activities compared to only a third (35%) of those without professional development. In addition, three out of
five (61%) of those without professional development reported using no reform activities compared to fewer than two out of five (39%) of those with the training (NCES, 1998).

At Bellevue Elementary School in St. Louis, Missouri, area, the staff has extended each school day by 10 minutes to gain a half-day each month for extra professional development activity. In other schools, similar plans have created early release times for students on Fridays and late arrival time at 11:30 for students on Wednesdays so that teachers could work together. At Alexander Elementary in Tampa, Florida, voluntary after-school meetings were scheduled on Mondays, where over half of the staff were in attendance. Videos were watched and discussed and professional articles read and discussed. On Wednesdays, teachers new to the building were invited to attend sessions designed to support their induction into Alexander professional community through peer assistance and collaborative discussion of policies and practices (Cantrell, Lang, & Matthews, 1999). In another school, an hour-early release of students and teachers each created a monthly Saturday professional half-day for teachers.

Parents and the public understand the need for qualified teachers. A survey by Recruiting New Teachers found that nearly twice as many people (55%) thought that the quality and caliber of teachers had the greatest influence on student learning compared with establishing a system of standards (30%) and requiring achievement tests (14%). Three out of five respondents (61%) strongly favor lengthening the school year by two weeks to allow more time for teacher consultation and planning while seven in ten (71%) agree that public schools should pay teachers for longer work days so they have time to stay abreast of new developments in their own field.
Moreover, teachers themselves report that teacher professional development has improved their teaching. More than four out of five teachers participating in professional development said it provided them with new information (85%), nearly two thirds reported it caused them to change their teaching practices (65%), more than three in five said that professional development programs caused them to seek further information or training (62%), and two out of five reported that the programs changed their views on teaching (42%).

Teacher Satisfaction with Resources

A major contributor toward many of the problems facing urban schools is their appalling lack of resources. Jonathan Kozol's (1991) Savage Inequalities eloquently describes the financial inequities that face many urban school districts in this country. As an example, an urban newspaper recently reported that the city's elementary schools often run out of money for supplies prior to the end of the year and local parent organizations are asked to fill the gap. Unfortunately, those schools with students from predominantly low-income neighborhoods find it more difficult to obtain the needed resources, and the students in those schools simply have to do without. Similar problems exist with regard to textbooks and other instructional materials and equipment. Recently, a local urban elementary school received a grant from a private foundation to install and network computers in all of the school's classrooms. Now that it has the computers, the school has been waiting six months for the district to send someone out to install the wiring, despite repeated pleas that it do so.
In many urban schools, the problem of creating an appropriate learning environment often takes a back seat to more fundamental issues of health and safety. Maintenance is a major problem, particularly in cities, because many of the schools are old and outdated. The ability to provide adequate heat, sanitation, and safety for the students and staff in urban schools is a major challenge that is largely ignored. Such problems must be addressed if schools are to become places in which teaching and learning are going to occur, but they cannot be addressed until schools possess adequate resources.

Perhaps even more critical than the need for additional resources for facilities, supplies, and instructional materials is the need for sufficient resources for training and staff development. As student populations become more diverse, their needs become more complex. Meanwhile, as increased knowledge about innovative strategies becomes available, the need to provide increased opportunities for staff development becomes more critical. Guskey (1982) investigated whether teacher expectations might change if teachers were given opportunities to improve their instructional effectiveness. The results suggested that changes in teacher expectations did occur and that high-quality staff development could be a significant factor in attaining the twin goals of teacher efficacy and student success. Unfortunately, the lack of resources in many urban school districts and the constraints on time mean that such training is rare. The result is that the teachers who work in our nation's cities have the greatest need for advanced training, yet they receive the fewest opportunities.
Summary

This chapter reviewed possible independent variables that may cause a difference in student achievement. The literature was reviewed under the following: instructional strategies, classroom management, teacher expectations, teacher satisfaction with resources, and professional learning.
CHAPTER III
THEORETICAL FRAMEWORK

Introduction

This study examined the extent to which student achievement in mathematics at the middle school level in a metropolitan Atlanta school district may be explained by certain school and teacher related variables such as instructional strategies, classroom management, teacher expectations, site-based professional learning, and teacher satisfaction with resources and how these factors might impact or cause a difference in student achievement in math as measured by the 2007 CRCT scores.

The assumption is that instructional strategies, classroom management, teacher expectations, site-based professional learning, and teacher satisfaction with resources will assist schools in providing quality instruction that will benefit low income, minority children and assist principals and/or leaders in providing quality leadership and that will benefit middle school teachers in low-income School Wide Title I middle schools and meet the needs of their students.

Definition of Variables

Dependent Variable

Student achievement: “Student achievement” in this study, refers to the degree of information mastered—scores reflecting Level 2 (800-849) or Level 3 (850+) by middle school students on the mathematics section of the Georgia Criterion Reference
Competency Test (CRCT) in low-income schools with specific factors which affect student achievement.

**Independent Variables**

*Instructional Strategies:* “Instructional strategies” in this study, refers to the use of a variety of teaching strategies, methods, and materials to increase student achievement.

*Classroom Management:* “Classroom Management” in this study, refers to teachers’ perceptions of a positive classroom environment, appropriate standards of behavior for students, student engagement, and effective management of routines and transitions.

*Teacher Expectations:* “Teacher Expectations” in this study, refers to teacher perceptions of inferences made by teachers about the future academic achievement of students.

*Resources:* “Resources” in this study, refers to the teachers’ perception of the availability and adequacy of resources such as equipment, material, and personal.

*Site-based Professional Learning:* “Site-based Professional Learning” in this study, refers to the perceived usefulness and ease of application of knowledge gained to enhance instructional delivery.
Independent Variables

- Instructional Strategies
- Classroom Management
- Teacher Expectations
- Teacher Satisfaction with Resources
- Site-Based Professional Learning

Dependent Variable

Student Achievement in Mathematics

Figure 2: Diagrammatic Representation of Study
Research Questions

RQ1: Is there a significant relationship between instructional strategies and student achievement in mathematics?

RQ2: Is there a significant relationship between teacher perceptions of classroom management and student achievement in mathematics?

RQ3: Is there a significant relationship between teacher expectations and student achievement in mathematics?

RQ4: Is there a significant relationship between teacher perception of the ease of application and usefulness of resources and student achievement in mathematics?

RQ5: Is there a significant relationship between site-based professional learning and student achievement?

RQ6: Is there a significant relationship between teacher gender, teacher grade level, and teacher preparation and student achievement?

RQ7: Which of the variables is the best predicator of student achievement as measured by the math 2007 CRCT scores?

Null Hypotheses

The following Null Hypotheses will guide this study.

$H_01$: There will be no significant relationship between instructional strategies and student achievement in mathematics.

$H_02$: There will be no significant relationship between teacher perceptions of the classroom management and student achievement in mathematics.
$H_03$: There will be no significant relationship between teacher expectations and student achievement in mathematics.

$H_04$: There will be no significant relationship between teacher perception of the ease of application and usefulness of resources and student achievement in mathematics.

$H_05$: There will be no significant relationship between site-based professional learning and student achievement.

$H_06$: There will be no significant relationship between teacher gender, teacher grade level, and teacher preparation and student achievement?

$H_07$: Classroom management is the best predicator of student achievement as measured by the math 2007 CRCT scores?

Summary

This chapter described the methodology and procedures that were used to conduct this study. This chapter also described the research design, the setting, sampling procedures, the instrument, data collection procedures, and the statistical applications.
CHAPTER IV
RESEARCH METHODOLOGY

Introduction

This study examined the extent to which student achievement in mathematics at the middle school level in a metropolitan Atlanta school district may be explained by certain school and teacher related variables such as instructional strategies, classroom management, teacher expectations, site-based professional learning, and teacher satisfaction with resources and how these factors might impact or cause a difference in student achievement in math as measured by the 2007 CRCT scores.

Research Design

This study employed a quantitative, ex-post facto design to review possible variables that may affect student achievement in mathematics grades six through eight. There are two main types of ex-post facto studies: retrospective and prospective. These designs find naturally occurring groups (thus, "after the fact") and follow them forward (prospective) or trace their histories (retrospective). There are challenges with the ex post facto study because subjects are not randomly assigned, as a result there will be inherent confounds in the populations studied (this is the most serious problem), sampling problems (often a convenient sample), and possibly dropouts in prospective studies or even detection bias. Retrospective studies have additional problems in that they rely on memory so the partial solutions are more difficult to employ successfully. However,
retrospective studies are more efficient (cheaper and faster) and may be necessary with very rare grouping variables of interest (e.g., rare diseases). Even with measurement and matching, internal validity is still questionable.

Sample Population

This metropolitan Atlanta school district had a student enrollment of more than 102,000 students in 143 schools and centers, and 13,285 full-time employees. Specifically, there are 84 elementary schools servicing 49,142 students, 20 middle schools servicing 22,647 students, 21 high schools servicing 29,290 students. Additionally, there are 20 centers which includes 14 Magnet Programs, 7 Theme Schools, 104 state-funded Pre-K classes, 6 Title I funded Pre-K classes, 3 Montessori programs, 1 science planetarium, 1 Open Campus High, 1 alternative school, 5 alternative programs, 3 vocational/technical schools, 6 exceptional student centers, and 1 International Center. Further, there 13,825 total employees; teachers 83.3%; support personnel 10.3%; administrators 6.4%.

The population for this study included middle school teachers. Four schools were selected for this study out of the 20 middle schools. As well, 50 teachers participated in this study. These participants taught students in grades six, seven, and eight, in mathematics on the CRCT during the spring 2007. Students in this study included the following subgroups: all students, black, white, male, female, economically disadvantaged, and not economically disadvantaged students. The teacher was the unit of analysis for this study. Each teacher’s average mean CRCT score was matched with the teacher responses to the survey items.
Description of Sample Sites

**School 1:** School 1 had an enrollment of 1,106 students during the 2007 CRCT administration. Within this population, 56.0% were economically disadvantaged, 13.0% were students with disabilities, and 8.0% of the population represented English Language Learners. The school did not make AYP in 2007.

**School 2:** School 2 had an enrollment of 1,029 students during the 2007 CRCT administration. Within this population, 87.0% were economically disadvantaged, 12.0% were students with disabilities, and 5.0% were English Language Learners. This school did not make AYP in 2007.

**School 3:** School 3 had an enrollment of 981 students during the 2007 CRCT administration. Within this population, 75.0% were economically disadvantaged, 11.0% were students with disabilities, and 1.0% was English Language Learners. This school did make AYP in 2007.

**School 4:** School 4 had an enrollment of 995 students during the 2007 CRCT administration. Within this population, 93.0% were economically disadvantaged, 13.0% were students with disabilities, and 1.0% was English Language Learners. This school did not make AYP in 2007.

Description of the Instrument

The instrument was self-developed and was examined by professors who have experience and expertise in the field of education, leadership and research. There are 50 questions on the questionnaire that require a Likert scale response on a 4-1 scale (4 = strongly agree, 3 = agree, 2 = disagree, 1 = strongly disagree). These statements
pertained to the extent to which student achievement in mathematics at the middle school level in a metropolitan Atlanta school district may be explained by certain school and teacher related variables such as instructional strategies, classroom management, teacher expectations, site-based professional learning, and teacher satisfaction with resources and how these factors might impact or cause a difference in student achievement in math as measured by the 2007 CRCT scores. The participants were asked to circle the appropriate number for each item. Questions 1-11 related to the independent variable instructional strategies, questions 12-19 related to the independent variable classroom management, questions 20-29 relate to the independent variable teachers expectations, questions 30-39 relate to the independent variable teacher use of resources, and questions 40-50 relate to the variable site-based professional learning. Questions 51-57 are general information.

It was assumed that the participants honestly responded to the items on the questionnaire. It was also expected that the number of participants would meet or exceed 30.

Data Collection Procedure

The Institutional Review Board (IRB) at Clark Atlanta University approved the topic for research. Afterwards, there are several items that were submitted to the Department of Research and Evaluation Review Board from the researcher. The items in the proposal included: six copies of a Comprehensive Research Proposal Outline, six letters of the Letter of Informed Consent, six copies of the questionnaire, six copies of the first three chapters (introduction, review of literature, and methodology), one copy of the
 Local Site Research Support Form signed by the principal of each proposed site, one copy of the College/University Research Proposal Approval Form, the original copy of the Letter of Institutional Endorsement, and the original copy of the Agreement to Provide a Copy of Final Research Project.

The above mentioned documents were approved and the researcher then provided a letter granting permission to distribute surveys to each school’s pre-selected contact person. The school’s contact person received the surveys via courier envelope. This person discussed the consent form in a departmental meeting and informed the potential participants of confidentiality and the time it would take to complete the survey—20 minutes. Confidentiality was maintained by requesting that the participants not include their names or other identifying marks on the questionnaire. The contact person distributed the surveys in a departmental meeting to the math teachers who choose to participate. Each participant was asked to rate factors on a four-point Likert Scale with “strongly agree” being the most significant and “strongly disagree” the least significant for questions 1-50. The participants were also asked to code demographic information on question 51-57. Math teachers were given two weeks to complete the questionnaire. The contact person collected all surveys, secured them in a courier envelope and placed the envelope in the vault. The researcher then picked up the surveys from the contact person at a designated time and date.

Data Analysis

The data for this study was analyzed statistically, determining the level of significance between the dependent variable and the independent variables. The
quantitative statistical analysis was conducted using the Statistical Package for Social Sciences Version 16 (SPSS). Descriptive and inferential statistical procedures Spearman correlation and chi-square were performed using SPSS version 16. Descriptive statistics were displayed in table format using frequencies, means, and standard deviations.

Each teacher classroom students' performance average in mathematics on the CRCT were used to determined the classroom overall student performance level in mathematics on the CRCT. The following teacher demographic variables were treated as ordinal data types: teacher education; teacher age; and teacher experience in the classroom. Teacher gender, teacher grade level, and teacher preparation were treated as nominal data types. Further, the data was subjected to Pearson $r$ Correlation analysis to determine the level of significance of the relationship between student achievement and each of the independent variables. The data was then subjected to regression analysis to determine which independent variables were the strongest predictors of student achievement. Research questions 1-5 were tested using correlational analysis. A regression analysis was used for question number 6.

The following teacher demographic variables were treated as ordinal data types: teacher education; teacher age; and teacher experience in the classroom. Teacher gender, teacher grade level, and teacher preparation were treated as nominal data types. Additionally, the survey items were grouped into five dimensions to represent Instructional Strategies (items 6,9,10 and 11), Classroom Management (items 18 and 19), Teacher Expectations (items 20, 21, 26, and 27), Teacher Use of Resources (items 30-39), and Site-based Professional Learning (items 40-50). The response choices were
assigned numerical values as interval data type: (4) Strongly Agree; (3) Agree, (2) Disagree and (1) Strongly Disagree. The dependent variable student achievement in mathematics on the CRCT had three performance levels as an ordinal data type: 1 = Does Not Meet Standards, 2 = Meet Standards, and 3 = Exceeds Standard Expectation.

Data from student achievement in math was collected from student records from the results of the CRCT 2007. The results were teacher based; this was the unit of analysis for the study.

Limitations

There were several limitations of which the researcher had little control. The participants in the study included four metropolitan Atlanta schools. The metropolitan area is comprised of many school systems with different demographics. Additionally, the study was based on perceptions of teachers, not observations. A final limitation is that there may have been other variables affecting student achievement in math, but instructional programs, classroom management, teachers expectations, teacher use of resources, and professional learning were examined in this study. Finally, the researcher has little control over honesty.

Summary

This study examined the extent to which student achievement in mathematics at the middle school level in a metropolitan Atlanta school district may be explained by certain school and teacher related variables. This study employed a quantitative, ex-post facto design to review possible variables that may affect student achievement in mathematics grades six through eight. The population for this study included middle
school teachers. Four schools were selected for this study out of the 20 middle schools. As well, 50 teachers participated in this study.

The instrument was self-developed and was examined by professors who have experience and expertise in the field of education, leadership and research. There are 50 questions on the questionnaire that require a Likert scale response on a 4-1 scale (4 = strongly agree, 3 = agree, 2 = disagree, 1 = strongly disagree). The Institutional Review Board (IRB) at Clark Atlanta University approved the topic for research. Afterwards, there were several items that were submitted to the Department of Research and Evaluation Review Board from the researcher. The documents were approved and the researcher then provided a letter granting permission to distribute surveys to each school’s pre-selected contact person. The contact person collected all surveys, secured them in a courier envelope and placed the envelope in the vault. The researcher then picked up the surveys from the contact person at a designated time and date. The data for this study was analyzed statistically, determining the level of significance between the dependent variable and the independent variables. The quantitative statistical analysis was conducted using the Statistical Package for Social Sciences (SPSS). Recommendations were provided.
CHAPTER V
DATA ANALYSIS

This study examined the extent to which student achievement in mathematics in a middle school located in a metropolitan Atlanta school could be explained by certain school and teacher related variables. The independent variables used in this study were instructional strategies, classroom management, teacher expectations, site-based professional learning, and teacher satisfaction with resources along with teacher demographics. These factors were believed to affect the dependent variable student achievement in mathematics as measured by the 2007 CRCT scores. Each teacher classroom students' performance average in mathematics on the CRCT were used to determined the classroom overall student performance level in mathematics on the CRCT. The following teacher demographic variables were treated as ordinal data types: teacher education; teacher age; and teacher experience in the classroom. Teacher gender, teacher grade level, and teacher preparation were treated as nominal data types.

The survey items were grouped into five dimensions to represent Instructional Strategies (items 6, 9, 10, and 11), Classroom Management (items 18 and 19), Teacher Expectations (items 20, 21, 26, and 27), Teacher Use of Resources (items 30-39), and Site-based Professional Learning (items 40-50). The response choices were assigned numerical values as interval data type: (4) Strongly Agree; (3) Agree, (2) Disagree, and (1) Strongly Disagree. The dependent variable student achievement in mathematics on
the CRCT had three performance levels as an ordinal data type: (1) Does Not Meet Standards; (2) Meet Standards (3) Exceeds Standard Expectation.

The following descriptive and inferential statistical procedures Spearman correlation and chi-square were performed using SPSS version 16.

Descriptive Statistics

The average teacher response disagreed that teacher expectations and teacher satisfaction with resources were adequate or sufficient. The average teacher response agreed that classroom management and site-based professional learning were adequate or sufficient. The average teacher response rated instructional strategies as less than agreeable and that they were adequate or sufficient (see Table 3).

Table 3

Teacher Responses

<table>
<thead>
<tr>
<th></th>
<th>Mean</th>
<th>SD</th>
<th>SE</th>
<th>Variance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Instructional Strategies</td>
<td>2.73</td>
<td>.605</td>
<td>.08</td>
<td>.366</td>
</tr>
<tr>
<td>Classroom Management</td>
<td>2.76</td>
<td>.832</td>
<td>.11</td>
<td>.694</td>
</tr>
<tr>
<td>Teacher Expectations</td>
<td>1.79</td>
<td>.427</td>
<td>.05</td>
<td>.183</td>
</tr>
<tr>
<td>Teacher Satisfaction with Resources</td>
<td>2.26</td>
<td>.423</td>
<td>.06</td>
<td>.180</td>
</tr>
<tr>
<td>Site-based Professional Learning</td>
<td>2.95</td>
<td>.391</td>
<td>.06</td>
<td>.154</td>
</tr>
</tbody>
</table>

(N = 51: 1 = Strongly Disagree; 2 = Disagree; 3 = Agree; 4 = Strongly Agree)

Fifty-six percent (56%) of teachers used in this study had classrooms with students on average scoring below meeting expectations on the mathematics CRCT.
Forty-four percent of teachers used in this study had classrooms with students on average scoring above meeting expectations on the mathematics CRCT (see Table 4). A majority of the students used in this study performed below expectations on the mathematics CRCT (see Table 5).

Table 4

*Descriptive Frequency of Student Performance Levels on CRCT in Mathematics*

<table>
<thead>
<tr>
<th>Student Performance</th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Below Expectations Level 1</td>
<td>28</td>
<td>54.9</td>
</tr>
<tr>
<td>Meet Expectations Level 2</td>
<td>16</td>
<td>31.4</td>
</tr>
<tr>
<td>Exceed Expectations Level 3</td>
<td>6</td>
<td>11.8</td>
</tr>
<tr>
<td>Missing System</td>
<td>1</td>
<td>2.0</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>51</strong></td>
<td><strong>100.0</strong></td>
</tr>
</tbody>
</table>

Table 5

*Student Performance Levels*

<table>
<thead>
<tr>
<th>Student Performance Levels</th>
<th>Mean</th>
<th>SD</th>
<th>SE</th>
<th>Variance</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 = Below Expectations</td>
<td>1.56</td>
<td>.705</td>
<td>.10</td>
<td>.496</td>
</tr>
<tr>
<td>2 = Meet Expectations</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3 = Exceed Expectations</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

(N = 51: 1 = Below Expectations; 2 = Meet Expectations; 3 = Exceed Expectations)

In order to test the relationships between student achievement in mathematics and the independent variables: instructional strategies, classroom management, teacher expectations, site-based professional learning, and teacher satisfaction with resources, the
following statistical procedures were conducted to address the research questions. The basis assumption was that there is a relationship with the independent variables and student achievement as measured by the 2007 CRCT mathematics.

Research Questions Results

Results of Correlation Analyses

Conceptually, it was proposed that if teachers used various teaching strategies, methods, and materials then, student achievement in such schools would be high. In order to test this relationship, a research question was generated and data was tested using the Spearman correlation statistical procedure.

RQ1: Is there a significant relationship between instructional strategies and student achievement in mathematics?

H₀1: There is no significant relationship between instructional strategies and student achievement in mathematics.

The data with respect to this research question are provided in Table 6. In the table, the following significant relationship is observed: Instructional strategies was not significantly related to student achievement in mathematics with a Spearman correlation of \( r(50) = 0.144, p = 0.320 \), and was not significant at the 0.05 level (calculated value being 0.320). The hypothesis was accepted. There was no significant relationship between instructional strategies and student achievement in mathematics on the CRCT.

Conceptually, it was proposed that if there were a positive classroom environment, appropriate standards of behavior for students, student equipment, and effective management of routines and transitions then, student achievement in such
Table 6

*Correlation Table of Independent and Dependent Variables with Student Achievement*

*(Performance Level)*

<table>
<thead>
<tr>
<th></th>
<th>R</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Instructional Strategies</td>
<td>.144</td>
<td>.320</td>
</tr>
<tr>
<td>Classroom Management</td>
<td>.119</td>
<td>.412</td>
</tr>
<tr>
<td>Teacher Expectation</td>
<td>.045</td>
<td>.758</td>
</tr>
<tr>
<td>Teacher Use of Resources</td>
<td>-.267</td>
<td>.067</td>
</tr>
<tr>
<td>Site-based Professional Learning</td>
<td>-.146</td>
<td>.317</td>
</tr>
</tbody>
</table>

N = 50; * p < 0.05

schools would be high. In order to test this relationship, a research question was generated and the data was tested using the Spearman correlation statistical procedure.

**RQ2:** Is there a significant relationship between teacher perceptions of classroom management and student achievement in mathematics?

**H₀₂:** There is no significant relationship between teacher perceptions of the classroom management and student achievement in mathematics.

The data with respect to this research question are provided in Table 6. In the table, the following significant relationship was observed: Classroom management was not significantly related to student achievement in mathematics with a Spearman correlation of r(50) = 0.119, p = 0.412, and was not significant at the 0.05 level (calculated value being 0.412). The hypothesis was accepted. There was no significant
relationship between teacher perceptions of classroom management and student achievement in mathematics on the CRCT.

Conceptually, it was proposed that if there were high expectations by teachers of students then, student achievement in such schools would be high. In order to test this relationship, a research question was generated and the data was tested using the Spearman correlation statistical procedure.

RQ3: Is there a significant relationship between teacher expectations and student achievement in mathematics?

H₀₃: There is no significant relationship between teacher expectations and student achievement in mathematics.

The data with respect to this research question was provided in Table 6. In the table, the following significant relationship was observed: Teacher expectations was not significantly related to student achievement in mathematics with a Spearman correlation of $r(50) = 0.045$, $p = 0.758$, and was not significant at the 0.05 level (calculated value being 0.758). The hypothesis was accepted. There was no significant relationship between teacher expectations and student achievement in mathematics on the CRCT.

Conceptually, it was proposed that if teachers had availability and adequacy of resources such as equipment, material and personal, then student achievement in such schools would be high. In order to test this relationship, a research question was generated and the data was tested using the Spearman correlation statistical procedure.
RQ4: Is there a significant relationship between teacher perception of the ease of 
application and usefulness of resources and student achievement in 
mathematics?

$H_04$: There is no significant relationship between teacher perception of the ease 
of application and usefulness of resources and student achievement in 
mathematics.

The data with respect to this research question are provided in Table 6. In the 
table, the following significant relationship was observed: Teacher perception of the ease 
of application and usefulness of resources was not significantly related to student 
achievement in mathematics with a Spearman correlation of $r(50) = -0.267$, $p = 0.067$, 
and was not significant at the 0.05 level (calculated value being 0.067). The hypothesis 
was accepted. There is no significant relationship between teacher perception of the ease 
of application and usefulness of resources and student achievement in mathematics on the 
CRCT.

Conceptually, it was proposed that if there were site-based professional learning 
(usefulness and ease of application of knowledge gained to enhance instructional 
knowledge) by teachers then, student achievement in such schools would be high. In 
order to test this relationship, a research question was generated and the data was tested 
using the Spearman correlation statistical procedure.

RQ5: Is there a significant relationship between site-based professional learning 
and student achievement?
$H_05$: There is no significant relationship between site-based professional learning and student achievement.

The data with respect to this research question are provided in Table 6. In the table, the following significant relationship was observed: Site-based professional learning was not significantly related to student achievement in mathematics with a Spearman correlation of $r(50) = -0.146$, $p = 0.317$, and was not significant at the 0.05 level (calculated value being 0.317). The hypothesis was accepted. There was no significant relationship between site-based professional learning and student achievement in mathematics on the CRCT.

Conceptually, it was proposed that there is a relationship between teacher demographics and student achievement. In order to test this relationship, a research question was generated and the data was tested using the non-parametric Spearman statistical procedure.

$RQ6$: Is there a significant relationship between teacher education, teacher age, teacher experience and teacher flexible grouping and student achievement?

$H_06$: There is no significant relationship between teacher education, teacher age, teacher experience and teacher flexible grouping and student achievement.

The data with respect to this research question are provided in Table 7. In the table, the following significant relationship was observed: Teacher education, teacher age, teacher experience and teacher flexible grouping was not significantly related to
Table 7

*Correlation Table of Moderating Demographic Variables with Student Achievement (Performance Level)*

<table>
<thead>
<tr>
<th>Variable</th>
<th>R</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Teacher Preparation Program</td>
<td>.181</td>
<td>.213</td>
</tr>
<tr>
<td>Teacher Age</td>
<td>.058</td>
<td>.691</td>
</tr>
<tr>
<td>Teacher Experience</td>
<td>.145</td>
<td>.322</td>
</tr>
<tr>
<td>Flexible Grouping</td>
<td>.086</td>
<td>.555</td>
</tr>
</tbody>
</table>

N = 50; * p < 0.05

Student achievement in mathematics. Teacher education was not significantly related to student achievement in mathematics with a Spearman of $r(50) = .181$, $p = 0.213$, and was not significant at the 0.05 level (calculated value being 0.213). Teacher age was not significantly related to student achievement in mathematics with a Spearman of $r(50) = .058$, $p = 0.691$, and was not significant at the 0.05 level (calculated value being 0.691). Teacher experience was not significantly related to student achievement in mathematics with a Spearman of $r(50) = .145$, $p = 0.322$, and was not significant at the 0.05 level (calculated value being 0.322). Teacher flexible grouping was not significantly related to student achievement in mathematics with a Spearman of $r(50) = .086$, $p = 0.555$, and was not significant at the 0.05 level (calculated value being 0.555). The hypothesis was accepted. There was no significant relationship between teacher education, teacher age, teacher experience and teacher flexible grouping and student achievement in mathematics on the CRCT.
Lastly, it was proposed that there is a relationship between teacher demographics and student achievement. In order to test this relationship, a research question was generated and data tested using the non-parametric Chi-square statistical procedure.

RQ7: Is there a significant relationship between teacher gender, teacher grade level, and teacher preparation and student achievement?

H07: There is no significant relationship between teacher gender, teacher grade level, and teacher preparation and student achievement.

The data with respect to this research question are provided in Table 8. In the table, the following significant relationship was observed: Teacher gender, and teacher grade level was not significantly related to student achievement in mathematics. Teacher gender was not significantly related to student achievement in mathematics with a Chi-square of $X(50) = 0.775$, $p = 0.379$, and was not significant at the 0.05 level (calculated value being 0.379). Teacher grade level was not significantly related to student achievement in mathematics with a Chi-square of $X(50) = 5.796$, $p = 0.122$, and was not significant at the 0.05 level (calculated value being 0.122). However, teacher preparation was significantly related to student achievement in mathematics with a Chi-square of $X(50) = 8.043$, $p = 0.005$, and was significant at the 0.05 level (calculated value being 0.005). The hypothesis was rejected. There was a significant relationship between teacher preparation and student achievement in mathematics on the CRCT. Teachers with college or university preparation had on average an association with students who performed at higher achievement performance level (see Table 9).
Table 8

*Chi-Square Table of Moderating Demographic Variables with Student Achievement (Performance Level)*

<table>
<thead>
<tr>
<th></th>
<th>X</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>Teacher Gender</td>
<td>.775</td>
<td>.379</td>
</tr>
<tr>
<td>Teacher Grade Level</td>
<td>5.796</td>
<td>.122</td>
</tr>
<tr>
<td>Teacher Preparation</td>
<td>8.043</td>
<td>.005*</td>
</tr>
</tbody>
</table>

N = 50; * p < 0.05

Table 9

*Descriptive Table of Teacher Preparation with Student Achievement (Performance Level)*

<table>
<thead>
<tr>
<th></th>
<th>College / University</th>
<th>Alternative Program</th>
</tr>
</thead>
<tbody>
<tr>
<td>Below Expectations</td>
<td>14</td>
<td>12</td>
</tr>
<tr>
<td>Meet Expectations</td>
<td>14</td>
<td>2</td>
</tr>
<tr>
<td>Exceeded Expectations</td>
<td>6</td>
<td>0</td>
</tr>
</tbody>
</table>

N = 50; * p < 0.05

Data was further analyzed using a regression analysis to determine variables with the greatest impact on student achievement. The only variable with a significant impact on student achievement was teacher use of resources with beta-coefficient of .295 which was significant at the 0.4 level (see Table 10).
Table 10

Table of Regression Analysis

<table>
<thead>
<tr>
<th>Model</th>
<th>R</th>
<th>R Square</th>
<th>Adjusted R Square</th>
<th>Standard Error of the Estimate</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>.295*</td>
<td>.087</td>
<td>.067</td>
<td>.685</td>
</tr>
</tbody>
</table>

a. Predictors: (Constant), Teacher Use of Resources

Coefficients*

<table>
<thead>
<tr>
<th>Model</th>
<th>Unstandardized</th>
<th>Standardized</th>
</tr>
</thead>
<tbody>
<tr>
<td>Constant</td>
<td>2.730</td>
<td>.556</td>
</tr>
<tr>
<td>Teacher use of Resources</td>
<td>-.503</td>
<td>-.295</td>
</tr>
</tbody>
</table>

a. Dependent Variable: Student Performance Level

Summary of Findings

The summary of the results indicated that there was no relationship between student achievement in mathematics and the independent variables: instructional strategies, classroom management, teacher expectations, site-based professional learning, and teacher satisfaction with resources. The only significant relationship found in this study was that there was a relationship between student achievement in mathematics as measured by the CRCT and teacher preparation. Teachers with college or university based preparation had students with higher student achievement performance levels.
Correlation of Independent Variables and Student Achievement

1. There was no significant relationship between instructional strategies and student achievement in mathematics on the CRCT.

2. There was no significant relationship between teacher perceptions of classroom management and student achievement in mathematics on the CRCT.

3. There was no significant relationship between teacher expectations and student achievement in mathematics on the CRCT.

4. There was no significant relationship between teacher perception of the ease of application and usefulness of resources and student achievement in mathematics on the CRCT.

5. There was no significant relationship between site-based professional learning and student achievement in mathematics on the CRCT.

Correlation of Teacher Demographics and Student Achievement

6. There was no significant relationship between teacher gender, teacher education, teacher age, teacher experience, and teacher flexible grouping and student achievement in mathematics on the CRCT.

7. There was a significant relationship between teacher preparation and student achievement in mathematics on the CRCT. Teachers with college or university based preparation had students with higher student achievement performance levels.
Regression Analysis

1. The variable with the greatest significant impact on student achievement was teacher use of resources with beta-coefficient of .295 which was significant at the 0.4 level.
CHAPTER VI

CONCLUSIONS, IMPLICATIONS, AND RECOMMENDATIONS

General Discussion

This study examined the extent to which student achievement in mathematics at the middle school level in a metropolitan Atlanta school district may be explained by certain school and teacher related independent variables such as instructional strategies, classroom management, teacher expectations, site-based professional learning, and teacher satisfaction with resources and how these factors might impact or cause a difference in student achievement in math as measured by the 2007 CRCT scores. The dependent variable in this study was student achievement.

Four schools were selected for this study out of the 20 middle schools. The population for this study included 50 middle school teachers. These participants taught students in grades six, seven, and eight, in mathematics on the CRCT during the spring 2007. The data for the study were collected via questionnaire given to teachers of students participating in the 2007 math CRCT. The four school sites were located in Title I schools with over 70% student eligibility for free or reduced lunch and 75% minority student enrollment.

The analysis of data is related to the six research questions identified in Chapter III. Pearson $r$ Correlation analysis, Chi-square, and a regression analysis were used to compute data. The research questions were answered based on the results obtained and
the level of significance used in this study for data analysis was .05. The findings and conclusions are presented based on the analysis of obtained data. Implications and recommendations are also discussed in this chapter.

Findings

The findings for each research question have been summarized in relation to the specific variables. A summary of the findings follows.

Research Question 1 can be answered in the negative. There was no significant relationship between instructional strategies and student achievement in mathematics on the CRCT.

Research Question 2 can be answered in the negative. There was no significant relationship between teacher perceptions of classroom management and student achievement in mathematics on the CRCT.

Research Question 3 can be answered in the negative. There was no significant relationship between teacher expectations and student achievement in mathematics on the CRCT.

Research Question 4 can be answered in the negative. There was no significant relationship between teacher perception of the ease of application and usefulness of resources and student achievement in mathematics on the CRCT.

Research Question 5 can be answered in the negative. There was no significant relationship between site-based professional learning and student achievement in mathematics on the CRCT.
Correlation of Teacher Demographics and Student Achievement

Research Question 6 can be answered in the negative. There was no significant relationship between teacher gender, teacher education, teacher age, teacher experience, and teacher flexible grouping and student achievement in mathematics on the CRCT.

Research Question 7 can be answered in the positive. There was a significant relationship between teacher preparation and student achievement in mathematics on the CRCT. Teachers with college or university based preparation had students with higher student achievement performance levels.

Conclusions and Implications

When the writer began this dissertation, she expected that all independent variables would have a significant relationship with the dependent variables. As well, she hypothesized that classroom management would be the strongest indicator of student achievement from the regression analysis. However, none of the independent variables (instructional strategies, classroom management, teacher expectations, teacher satisfaction with resources, or site-based professional learning) were significant in this study. The following conclusions were drawn from this study.

Conclusion #1

None of the independent variables (instructional strategies, classroom management, teacher expectations, teacher satisfaction with resources, or site-based professional learning) were significant (0.05 level) in this study.
Implication #1

Leaders should consider individual solutions, such as revising instructional strategies.

In an effort to assist teachers in improving math scores, the school district in this study spent 3 million dollars on a math program for four consecutive years. As a part of the exhaustive 13.2 million dollars program, district leaders also hired Instructional Coaches and assigned them to assist in language arts and mathematics at local sites. Although language arts scores did increase each year, the math scores are still below expectations in the district; math achievement did not improve in all of the schools in this study either.

Teachers should meet once a week and work in study groups to disaggregate benchmark data, discuss instructional math strategies (i.e. flexible grouping, station teaching, and differentiation) and plan lessons to help students master math concepts. Hence, the value of using manipulative materials to investigate a concept, for example, depends not only on whether manipulative is used, but also on how it is used with students. Similarly, small group instruction benefits students only if the teacher knows when and how to use this teaching practice (Tileston, 2004). Therefore, continued professional learning at the local level must be a priority of the building level administrators who are at the local sites on a daily basis. Many Instructional Coaches are assigned two schools, meet once a week with teachers, and are often out of the building. As educators implement recommendations, it is essential that they constantly
monitor and adjust the way the practice is implemented in order to optimize improvements in quality.

Furthermore, all leaders should be expected to disaggregate data and assist teachers in developing meaningful lessons that center around students’ individual needs. This is essential since the math section of the CRCT consists of algebra, number sense and operations, and geometry and patterns and relationships. Often times students score higher in some domains than others; therefore, it is critical that leaders help teachers utilize formative data to create individual lessons. There may be areas of the math CRCT that certain students mastered and areas where other students are not comfortable. If the teachers do not address any of these concerns, this may reduce a student’s interest the class and may contribute to lower math scores. Therefore, individual lessons must be planned based on the needs of the students in each classroom. This is an instructional technique that must be monitored constantly to enhance student improvement.

There are other variables that affect student achievement. After the data analysis, the writer searched for reasons why the relationship between the independent and dependent variables were not significant and was able to attribute a lack of significance to the sample size. There were only 50 participants in the study; if the study included more participants, there may have been more significant relationships. For example, the variables did not include socioeconomic status (SES) or any classroom observations. These two variables or others, if added, may have changed the level of significant in this study and created a stronger relationship with the independent variable student
achievement. Finally, the study may have included more schools, students, and/or teachers to expand the results, which may have yielded significant results.

Teacher expectations, for instance, was not significant in this study. This may be due to verbal and/or non-verbal communication in the classroom. Teachers may send messages to students that hinder student progress toward academic goals. This type of communication may not be recognized or even considered by the individual teachers who completed this survey. This may have been a result of the way the survey questions were asked. Likewise, teachers may conduct classes that discourage student from asking questions, teachers may even give less wait time for specific students when they ask questions or are asked questions. Further, teachers may ask certain students higher order thinking questions and even give more or less written feedback to certain students. All of the abovementioned communication methods/strategies may have contributed to this conclusion reached from the independent variable teacher expectations.

Conclusion #2

The variable with the greatest significant impact on student achievement was teacher use of resources with beta-coefficient of .295, which was significant at the 0.04 level as illustrated in Table 8, Chapter V.

Implication #2

Time should be valued as a resource; leaders must budget time for site based professional learning.

Collaborative adult learning experiences not only enable teachers to adjust their pedagogy to help students learn more; they also provide opportunities for school staff to
revisit the school’s vision and goals, develop a collective perspective on teaching practice, and create a stronger school culture. They provide time for teachers to talk together about individual students to figure out how to best support them.

Providing teacher preparation and site-based professional development helps increase teacher knowledge and skills in mathematics and the teaching of mathematics. Professional learning is a resource for teachers. Likewise, professional learning opportunities should be afforded to teachers before school, after school, during the school day, during summers, and during professional leaves to improve math achievement. These activities should continue with appropriate adaptations throughout teachers’ careers. Math groups, time to observe in another teacher’s classroom, even intensive mathematics sessions on algebra integration must be strategically sought after from the administrators. Hence, it is suggested that educational leaders create time for professional development and research school and school systems where creative ways of professional development are utilized.

Furthermore, teachers must seek to improve their teaching effectiveness by changing their instructional practices through professional learning; they should carefully consider the teaching context, giving special attention to the types of students they teach. Further, they should not judge the results of their new practices too quickly. Judgments about the appropriateness of their decisions must be based on more than a single outcome. If the results are not completely satisfactory, teachers should consider the circumstances that may be diminishing the impact of the practices they are implementing.

According to Darling-Hammond (1998), professional development strategies that
succeed in improving teaching share several features. They tend to be experiential, engaging teachers in concrete tasks of teaching, assessment, and observation that illuminate the processes of learning and development. As well they are grounded in participants' questions, inquiry, and experimentation as well as profession wide research.

Conclusion #3

Teacher preparation was significantly related to student achievement in mathematics with a Chi-square of $X(50) = 8.043$, $p = 0.005$, and was significant at the 0.05 level (calculated value being 0.005). Teachers with college or university based preparation had students with higher student achievement performance levels as illustrated in Table 7, Chapter V.

Implication #3

Leaders should invest in professional development schools with colleges that offer extended programs for teachers.

Teachers who received preparation at colleges and universities had students with higher performance levels on the CRCT. This conclusion may be due to the different pathways accorded to individuals who choose various courses for teaching. An introduction to two alternative programs follows.

There are two alternative programs in the district in which this study was done. The Teacher Alternative Preparation Program (TAPP) is designed to provide a non-traditional preparation route to teacher certification. The required coursework will be completed through a blended model of online and face-to-face coursework. Eligible candidates teach full time and are supervised by a support team of trained Itinerant
Teacher Support Specialist a mentor teacher and a school administrator. The Itinerant Teacher Support Specialist will make weekly school site visits to provide individual support. This is a two year program that costs employees $1,025.00. Interested applicants must have an offer of employment as a full-time teacher with the system, have a passing Georgia Assessments for Certification of Educators (GACE) 1 test score parts or a Scholastic Aptitude Test (SAT -1000), Graduate Record Exam (GRE - 1030) or American College Test (ACT - 43), and have a minimum of 2.5 undergraduate grade point average (GPA) (no expectations). Finally, applicants must agree to teach in the district for three years after receiving a clear renewable teaching certificate and must have mathematics as an undergraduate degree. Teaching assignments are aligned to undergraduate degrees.

Preparing Alternatively Certified Educators for Special Education (PACES) is a program funded by a grant from the U.S. Department of Education Office of Innovation and improvement. This certification program prepares candidates to teach students with disabilities in a co-teaching model and prepares them for Special Education General Curriculum certification. A large majority of the coursework will be completed through the University of Georgia’s Special Education Training on the Web (SETWEB) online program. The program will provide several layers of support for candidates through mentoring relationships. A PACES coach who specializes in new teacher induction will support each PACES candidate. This is a two year program that cost employees approximately $3,000.
Interested applicants must have an offer of employment as a full time Special Education General Curriculum Inclusion teacher with the district, have a passing GACE 1 test score, have a minimum undergraduate GPA of 2.5, and agree to teach in the county for three consecutive years after receiving a clear renewable teaching certificate. All degree fields are eligible; however, preferred fields are Psychology, Sociology, Criminal Justice, Social Work, and School Counseling.

While the tradition four year education programs require an entry level writing exam (Analytical Writing Placement Examination) and a reading comprehension requirement. When comparing PACES to the Adapted Curriculum for Special Education requirement, there are notable differences. For example, interested applicants must complete more classes and a longer supervised internship. Classes include: Technology and Information Systems, Human Growth and Development, as well as Content Area classes such as Behavior Management, Psychology of Exceptional Children, Diagnosis in Special Education, and Diagnostic Reading for Teaching Reading. In addition, potential graduated must secure specialization in classes such as Nature and Characteristics of the Intellectually Disabled, Methods, Materials and Curriculum for Behavioral Disorders, and Clinical Experiences. Further, students must complete student teaching in Special Education and a seminar is required for all students enrolled in practicum, internship and student teaching. The coursework is extensive. In addition, the internship program is an opportunity for students to experience the classroom setting under the supervision of an experienced educator.
Compared to a tradition college preparation program, PACES is a much faster program and it prepares candidates to teach students with disabilities in a co-teaching model and prepares them for Special Education General Curriculum certification. Hence, the individuals teaching the students with lower scores (in some cases) and more needs have teachers who are not currently certified. Further, the teachers are expected to teach with another individual using various successful co-teaching models (station, parallel, and alternative teaching). These models may need to be modeled by peers and even monitored for effective implementation if they are to maximize achievement in mathematics. As well, there may be several layers of support for candidates through mentoring relationships, but how often do these individuals visit the actual school and watch the teacher plan the lesson or work with a general education teacher? This is the benefit of the supervising teacher at the college or university preparation program as well as the coursework.

Finally, PACES candidate are supported by a PACES coach who specializes in new teacher induction. But, is this individual certified from a traditional college or university preparation program? And where is the data from the monitoring? All participants in student teaching must complete a portfolio of this work. This serves as an instructional tool that assists new hires in securing and maintaining teaching positions.

All potential teachers need support, but the specific support provided regarding lesson plans, lesson study, supervising teacher relationships, classroom practice before real life application, help prepare the college or university graduate for teaching at many levels. With more than 300 schools of education in the United States, there are many
programs that extend beyond the traditional four-year bachelor's degree program. Some are one- or two-year graduate programs for recent graduates or mid-career recruits. Others are five-year models for prospective teachers who enter teacher education as undergraduates. In either case, the fifth year allows students to focus exclusively on the task of preparing to teach, with year-long, school-based internships linked to coursework on learning and teaching. Further, many colleges or universities have professional learning teams which are inadvertently, at times, established by the students in the classrooms. These groups are usually study groups or action research teams who work regularly on mini projects throughout a semester to meet a goal.

Studies have found that graduates of these extended programs are more satisfied with their preparation, and their colleagues, principals, and cooperating teachers view them as better-prepared. Extended program graduates are as effective with students as are much more experienced teachers and are much more likely to enter and stay in teaching than their peers prepared in traditional four-year programs (Andrew & Schwab, 1995; Denton & Peters, 1988; Shin, 1994).

Many of these programs have joined with local school districts to create professional development schools. Like teaching hospitals, these schools aim to provide sites for state-of-the-art practice and for teacher learning. Both university and school faculty plan and teach in these programs.

Despite the best efforts, this kind of learning cannot occur in college classrooms divorced from practice or in school classrooms divorced from knowledge about how to interpret practice. Better settings for such learning are appearing. We must, therefore,
add activities gradually so that they are not engulfing to the teacher or student. Leaders must develop sustainability in these efforts if they are expected to provide improvements in math achievement. Sustainability is developed by leaders by how they approach, commit to, and protect deep learning in their schools; by how they sustain others around them to promote and support learning; by how they sustain themselves in doing so, so that they can persist with their vision and avoid burning out, and by how they try to ensure that the improvements they bring about last over time, especially after they themselves have gone (Blankstein, 2004).

Beginning teachers get a more coherent learning experience when they teach and learn in teams with these veteran faculties and with one another. Senior teachers deepen their knowledge by serving as mentors, adjunct faculty, co-researchers, and teacher leaders (Darling-Hammond, 1994). Likewise, district leaders are recommended to examine fifth-year educational intern programs and mentorship’s to help retain and develop less experienced math teachers.

Resources afforded to teachers and put into place resources that would assist math teachers in improving students’ achievement should be closely monitored. District, central office personnel, and administrators are recommended to examine support for novice teachers and seek assistance from colleges with university-based preparation programs. However, none of these changes resulted from the mass implementation of new programs. Rather, they surface from the hard work necessary to make desired changes in local school environments, designed to address carefully identified learning problems, accomplished teacher by teacher and student by student. This observation
suggests that meaningful and lasting changes are incremental and directed toward particular problems (Sinclair & Ghory, 1997).

Further, administrative practices must organize professional learning at the local school level and budget to allow for on-going professional learning throughout the year. Professional learning must be structured and monitored if math achievement is to improve. Central office personnel may consider a more rigorous approach to offer and monitor teacher implementation of skills taught in professional learning sessions. This may include, but would not be limited to, instructional coaches and administrators documenting what was taught and re-delivered to small groups/teams and how best practices were implemented in math classes.

Recommendations for District Leaders

1. Focus principals on using data for professional learning;
2. Create professional learning with study teams identity learning strengths;
3. Use leadership meetings to describe math challenges accurately rather than spending too much time on why the problem exists;
4. Emphasize what can be done to engender success for students rather than lower expectations for learning;
5. Determine the nature of the intervention required before selecting the person or persons to help student(s).

Recommendations for Administrators

1. Change the way students are grouped/scheduled to reduce labeling;
2. Offer professional learning opportunities grounded in research;
3. Connect workshops to teachers’ work, teaching methods, and students;
4. Create joint planning time/time for collaboration;
5. Create in-house experts through the use of collaborative study groups;
6. Offer mentors and regularly scheduled meetings that allow teachers to discuss problems of the practice; this may help retain novice teachers;
7. Provide release time for teachers to observe other teachers, critiques lessons, and prepare lessons;
8. Use resources effectively with current research practices;
9. Attend professional leaning in an effort to model, coach, and problem solve around specific problems for teachers;
10. Assess, evaluate and continue to monitor all professional learning.

Recommendations for Teachers

Teachers are recommended to examine the resources and put into place strategies that would assist in improving students’ math achievement. Such practices would include:

1. Using resources such as formative data (CRCT) to plan meaningful lessons;
2. Using resources to plan lessons that expose students to new material and more difficult material;
3. Fashion all instructional resources and solutions proximate to the specific problem.
Direction for Further Research

Although informative, this analysis falls significantly short of its original goal to provide a comprehensive review of research on math achievement in middle schools. Even though four middle schools were included in this study, it is recommended that further research is done on this topic to include more than four middle schools, and include elementary and high schools. Indeed, this study could be expanded to include students as the unit of analysis for this study or maybe even parents. The survey may also be expanded to include additional independent variables that might impact or cause a difference in student achievement such as parental involvement, truancy, student absenteeism, peer pressure, opportunity to learn, teacher commitment to school-wide discipline plan, student prior knowledge, summer learning loss, school culture, time to study and socioeconomic status (SES). For these reasons, the final recommendations for this study are:

1. Including more middle schools in this study;
2. Expanding the study to include elementary and/or high schools;
3. Including students as the unit of analysis;
4. Expanding the independent variables;
5. Developing procedures and practices to monitor professional learning; and
6. Further research on this topic.

The research presented in this dissertation provides a starting point for developing school plans to improve mathematics instruction. The practices identified reflect a mixture of emerging strategies and practices in long-term use. Nonetheless, teachers and
school leaders will inevitably need time for further study, discussion and other exposure to what a particular practice entails before deciding to make changes to existing programs. As a final point, readers are cautioned that the findings in this study should be considered “indicators” of the conclusions that might be drawn from an exhaustive review on the research on math achievement. On the other hand, readers should feel confident that these findings represent a sound basis for classroom teachers and administrators to begin adapting and experimenting with the strategies describes in this dissertation.
APPENDIX A

Student Performance Level Tables

Table A1

*Student Performance Level*

<table>
<thead>
<tr>
<th></th>
<th>Frequency</th>
<th>Percent</th>
<th>Valid Percent</th>
<th>Cumulative Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Valid</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Below Expectations</td>
<td>28</td>
<td>54.9</td>
<td>56.0</td>
<td>56.0</td>
</tr>
<tr>
<td>Meet Expectations</td>
<td>16</td>
<td>31.4</td>
<td>32.0</td>
<td>88.0</td>
</tr>
<tr>
<td>Exceed Expectations</td>
<td>6</td>
<td>11.8</td>
<td>12.0</td>
<td>100.0</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>50</td>
<td>98.0</td>
<td>100.0</td>
<td></td>
</tr>
<tr>
<td><strong>Missing</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>System</td>
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<td>2.0</td>
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<td></td>
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<td><strong>Total</strong></td>
<td>51</td>
<td>100.0</td>
<td></td>
<td></td>
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</table>

Statistics

<table>
<thead>
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<th>Student Performance Level</th>
<th>Valid</th>
<th>Missing</th>
</tr>
</thead>
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<tr>
<td>N</td>
<td>50</td>
<td>1</td>
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<td>Mean</td>
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<td>Std. Error of Mean</td>
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<td>Median</td>
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<td>Variance</td>
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</table>
APPENDIX B

Correlation Tables

Table B1

*Independent and Dependent Variables Student Achievement (Performance Level)*

<table>
<thead>
<tr>
<th>Correlations</th>
<th>Student Performance Level</th>
</tr>
</thead>
<tbody>
<tr>
<td>Instructional Strategies</td>
<td>Pearson Correlation -.014</td>
</tr>
<tr>
<td></td>
<td>Sig. (2-tailed) .923</td>
</tr>
<tr>
<td></td>
<td>N 50</td>
</tr>
<tr>
<td>Classroom Management</td>
<td>Pearson Correlation .088</td>
</tr>
<tr>
<td></td>
<td>Sig. (2-tailed) .542</td>
</tr>
<tr>
<td></td>
<td>N 50</td>
</tr>
<tr>
<td>Teacher Expectation</td>
<td>Pearson Correlation -.055</td>
</tr>
<tr>
<td></td>
<td>Sig. (2-tailed) .705</td>
</tr>
<tr>
<td></td>
<td>N 50</td>
</tr>
<tr>
<td>Teacher Use of Resources</td>
<td>Pearson Correlation -.295</td>
</tr>
<tr>
<td></td>
<td>Sig. (2-tailed) .041</td>
</tr>
<tr>
<td></td>
<td>N 48</td>
</tr>
<tr>
<td>Site-based Professional Learning</td>
<td>Pearson Correlation -.111</td>
</tr>
<tr>
<td></td>
<td>Sig. (2-tailed) .448</td>
</tr>
<tr>
<td></td>
<td>N 49</td>
</tr>
<tr>
<td>Teacher Education</td>
<td>Pearson Correlation</td>
</tr>
<tr>
<td>-------------------</td>
<td>---------------------</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>Teacher Age</td>
<td>Pearson Correlation</td>
</tr>
<tr>
<td>Teacher Experience</td>
<td>Pearson Correlation</td>
</tr>
<tr>
<td>Flexible Grouping</td>
<td>Pearson Correlation</td>
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</tbody>
</table>
Independent Variables Mean Responses by Student Performance Level

<table>
<thead>
<tr>
<th>Category</th>
<th>Below Expectations</th>
<th>Meet Expectations</th>
<th>Exceed Expectations</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Instructional Strategies</strong></td>
<td>28</td>
<td>16</td>
<td>6</td>
<td>50</td>
</tr>
<tr>
<td>Mean</td>
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<td>2.5303</td>
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<td>.36815</td>
<td>.46503</td>
<td>.34973</td>
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<td>.04946</td>
</tr>
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<td><strong>Classroom Management</strong></td>
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<td>16</td>
<td>6</td>
<td>50</td>
</tr>
<tr>
<td>Mean</td>
<td>2.7736</td>
<td>2.8504</td>
<td>2.8333</td>
<td>2.8054</td>
</tr>
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<td>Std. Deviation</td>
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<td>.28211</td>
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<td>.34706</td>
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<td>Std. Error</td>
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<td>.07053</td>
<td>.05270</td>
<td>.04908</td>
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<td><strong>Teacher Expectation</strong></td>
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<td>16</td>
<td>6</td>
<td>50</td>
</tr>
<tr>
<td>Mean</td>
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<td>2.1326</td>
<td>2.3000</td>
<td>2.2259</td>
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<td>Std. Error</td>
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<td>.07900</td>
<td>.18439</td>
<td>.04508</td>
</tr>
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<td><strong>Teacher Use of Resources</strong></td>
<td>26</td>
<td>16</td>
<td>6</td>
<td>48</td>
</tr>
<tr>
<td>Mean</td>
<td>2.3577</td>
<td>2.2826</td>
<td>1.9333</td>
<td>2.2796</td>
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<tr>
<td>Std. Deviation</td>
<td>.39107</td>
<td>.45983</td>
<td>.24221</td>
<td>.41684</td>
</tr>
<tr>
<td>Std. Error</td>
<td>.07670</td>
<td>.11496</td>
<td>.09888</td>
<td>.06017</td>
</tr>
<tr>
<td><strong>Site-based Professional Learning</strong></td>
<td>27</td>
<td>16</td>
<td>6</td>
<td>49</td>
</tr>
<tr>
<td>Mean</td>
<td>3.0025</td>
<td>2.9489</td>
<td>2.8788</td>
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<tr>
<td>Std. Deviation</td>
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<td>.37955</td>
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<tr>
<td>Std. Error</td>
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<td>.08781</td>
<td>.20951</td>
<td>.05422</td>
</tr>
</tbody>
</table>

(N = 50: 1 = Strongly Disagree; 2 = Disagree; 3 = Agree; 4 = Strongly Agree)
APPENDIX D

Regression Analysis Tables

Model Summary

<table>
<thead>
<tr>
<th>Model</th>
<th>R</th>
<th>R Square</th>
<th>Adjusted R Square</th>
<th>Std. Error of the Estimate</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>.295a</td>
<td>.087</td>
<td>.067</td>
<td>.685</td>
</tr>
</tbody>
</table>

a. Predictors: (Constant), Teacher Use of Resources

ANOVAb

<table>
<thead>
<tr>
<th>Model</th>
<th>Sum of Squares</th>
<th>df</th>
<th>Mean Square</th>
<th>F</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Regression</td>
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<td>1</td>
<td>2.066</td>
<td>4.399</td>
<td>.041a</td>
</tr>
<tr>
<td>Residual</td>
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<td>46</td>
<td>.470</td>
<td></td>
<td></td>
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<tr>
<td>Total</td>
<td>23.667</td>
<td>47</td>
<td>.470</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

a. Predictors: (Constant), Teacher Use of Resources
b. Dependent Variable: Student Performance Level

Coefficientsa

<table>
<thead>
<tr>
<th>Model</th>
<th>Unstandardized Coefficients</th>
<th>Standardized Coefficients</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>B</td>
<td>Std. Error</td>
</tr>
<tr>
<td>1 (Constant)</td>
<td>2.730</td>
<td>.556</td>
</tr>
<tr>
<td>Teacher Use of Resources</td>
<td>-.503</td>
<td>.240</td>
</tr>
</tbody>
</table>

a. Dependent Variable: Student Performance Level

101
### Excluded Variables

<table>
<thead>
<tr>
<th>Model</th>
<th>Beta</th>
<th>t</th>
<th>Sig.</th>
<th>Partial Correlation</th>
<th>Co-linearity Statistics</th>
</tr>
</thead>
<tbody>
<tr>
<td>Instructional Strategies</td>
<td>-.140&lt;sup&gt;a&lt;/sup&gt;</td>
<td>-.904</td>
<td>.371</td>
<td>-.134</td>
<td>.835</td>
</tr>
<tr>
<td>Classroom Management</td>
<td>.111&lt;sup&gt;a&lt;/sup&gt;</td>
<td>.784</td>
<td>.437</td>
<td>.116</td>
<td>1.000</td>
</tr>
<tr>
<td>Teacher Expectation</td>
<td>-.083&lt;sup&gt;a&lt;/sup&gt;</td>
<td>-.574</td>
<td>.568</td>
<td>-.085</td>
<td>.971</td>
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<tr>
<td>Site-based Professional Learning</td>
<td>-.064&lt;sup&gt;a&lt;/sup&gt;</td>
<td>-.430</td>
<td>.669</td>
<td>-.064</td>
<td>.902</td>
</tr>
<tr>
<td>Teacher Education</td>
<td>.217&lt;sup&gt;a&lt;/sup&gt;</td>
<td>1.563</td>
<td>.125</td>
<td>.227</td>
<td>1.000</td>
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<tr>
<td>Teacher Age</td>
<td>.151&lt;sup&gt;a&lt;/sup&gt;</td>
<td>1.071</td>
<td>.290</td>
<td>.158</td>
<td>.992</td>
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<tr>
<td>Teacher Experience</td>
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<td>1.131</td>
<td>.264</td>
<td>.166</td>
<td>.993</td>
</tr>
<tr>
<td>Flexible Grouping</td>
<td>.163&lt;sup&gt;a&lt;/sup&gt;</td>
<td>1.155</td>
<td>.254</td>
<td>.170</td>
<td>.989</td>
</tr>
</tbody>
</table>

<sup>a</sup> Predictors in the Model: (Constant), Teacher Use of Resources

<sup>b</sup> Dependent Variable: Student Performance Level
APPENDIX E

Survey

Factors that Affect Students Math Achievement in grades 6-8

This survey is being conducted to gather opinions about the quality of education in a large school district. Information collected will be used to improve student achievement in mathematics in grades sixth through eight and services to teachers and students. You can help by answering all questions frankly and honestly. Your reaction to each item will help us in evaluating site based programs. All responses will be anonymous; no one will see your individual answers. Please do not write your name on the survey.

Following each statement, indicate your level of agreement or disagreement by circling the appropriate response. Please circle only one response for each statement.

Strongly Agree - 4  Agree - 3  Disagree - 2  Strongly Disagree - 1

Instructional Strategies. “Instructional strategies” in this study, refers to the use of a variety of teaching strategies, methods, and materials to increase student achievement.

1. My students will get confused if I move away from the instructional method to which they are accustomed. 4 3 2 1

2. We do not get enough materials/manipulatives to present various instructional strategies to make math challenging for students. 4 3 2 1

3. I present mathematical concepts using the overhead projector most of the time. 4 3 2 1

4. Our school does not help provide a variety of instructional strategies to address the various learning styles in my math classes. 4 3 2 1

5. In math, it is better to employ just one instructional method when introducing new material in order to reduce misunderstanding among the students. 4 3 2 1

6. By differentiating instruction and providing students with varying ways to do the exercises it increases their difficulty of completing assignments. 4 3 2 1
Appendix E (continued)

Please circle only one response for each statement

<table>
<thead>
<tr>
<th>Strongly Agree – 4</th>
<th>Agree – 3</th>
<th>Disagree – 2</th>
<th>Strongly Disagree – 1</th>
</tr>
</thead>
<tbody>
<tr>
<td>7. Students are likely to play and be off task if differentiated methods are used in teaching mathematics.</td>
<td>4 3 2 1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>8. If I employ more than one teaching methods for re-teaching material, students still do not master the mathematical concepts.</td>
<td>4 3 2 1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>9. Student readiness levels affect my instructional delivery.</td>
<td>4 3 2 1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>10. Students’ learning performances affect my instructional delivery.</td>
<td>4 3 2 1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>11. Student interests affect my instructional delivery.</td>
<td>4 3 2 1</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Classroom Management:** “Classroom Management” in this study, refers to teachers’ perceptions of a positive classroom environment, appropriate standards or behavior for students, student engagement, and effective management of routines and transitions.

| 12. Students need firm handling to learn. | 4 3 2 1 |
| 13. Teachers in this school who try to be flexible in managing their classes will soon lose control. | 4 3 2 1 |
| 14. Math is not intrinsically interesting; therefore, the usual forms of motivation cannot be used to manage students. | 4 3 2 1 |
| 15. If a teacher has good relationships with students, then students accept his/her rules, procedures, and disciplinary actions. | 4 3 2 1 |
| 16. I reward acceptable behavior in my classes. | 4 3 2 1 |
| 17. Teachers must have strict ways of doing things and clear motives otherwise students become confused. | 4 3 2 1 |
| 18. I am satisfied with the level of disciplinary consequences for student behavior in my class. | 4 3 2 1 |
| 19. My students are fully aware of the steps and consequences in our school’s discipline plan. | 4 3 2 1 |
Appendix E (continued)

Teacher Expectations: “Teacher Expectations” in this study, refers to teacher perceptions of inferences made by teachers about the future academic achievement of students.

<table>
<thead>
<tr>
<th>Strongly Agree – 4</th>
<th>Agree = 3</th>
<th>Disagree – 2</th>
<th>Strongly Disagree – 1</th>
</tr>
</thead>
<tbody>
<tr>
<td>20. The students in this school make it difficult to establish clear classroom routines.</td>
<td>4 3 2 1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>21. Students are motivated by expectations set by the teacher.</td>
<td>4 3 2 1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>22. These students cannot be encouraged to go beyond the textbook teacher guidance to achieve.</td>
<td>1 2 3 4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>23. Only the brightest students can be expected to have high levels of interest in mathematics.</td>
<td>4 3 2 1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>24. Level 1 students need more academic support</td>
<td>4 3 2 1</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Teacher Expectations: “Teacher Expectations” in this study, refers to teacher perceptions of inferences made by teachers about the future academic achievement of students.

| 25. Less than 50% of students in this school will go to college. | 4 3 2 1 |
| 26. Given the background of students in our school it is unrealistic to expect they will do well in mathematics. | 4 3 2 1 |
| 27. Seeing that resources are scarce, schools should concentrate on getting only the brightest students to do math. | 4 3 2 1 |
| 28. Teacher expectations for ethnic minority children from lower-socioeconomic groups are generally lower than those for other children. | 4 3 2 1 |
| 29. Any student taken out and treated separately in an academic environment will create discipline problems. | 4 3 2 1 |

Teacher use of Resources: “Resources” refers to the teachers’ perception of the availability and adequacy of resources such as equipment, material, and personal.

| 30. Mathematical equipment is up-to-date in our school. | 4 3 2 1 |
| 31. We have enough resources to support math instruction. | 4 3 2 1 |
Appendix E (continued)

Please circle only one response for each statement

<table>
<thead>
<tr>
<th>Strongly Agree – 4</th>
<th>Agree = 3</th>
<th>Disagree – 2</th>
<th>Strongly Disagree – 1</th>
</tr>
</thead>
<tbody>
<tr>
<td>32. Class sizes are small enough for effective teaching of math</td>
<td>4</td>
<td>3</td>
<td>2</td>
</tr>
<tr>
<td>33. There are enough materials/resources to assist me in the classroom.</td>
<td>4</td>
<td>3</td>
<td>2</td>
</tr>
<tr>
<td>34. Parents of my students give substantial support in math</td>
<td>4</td>
<td>3</td>
<td>2</td>
</tr>
<tr>
<td>35. I am satisfied with my opportunities to interact formally with faculty members to gain additional ideas on new instructional strategies.</td>
<td>4</td>
<td>3</td>
<td>2</td>
</tr>
<tr>
<td>36. Parents are familiar with what students are expected to know in order to deal with math.</td>
<td>4</td>
<td>3</td>
<td>2</td>
</tr>
<tr>
<td>37. Parents supervise homework effectively</td>
<td>4</td>
<td>3</td>
<td>2</td>
</tr>
<tr>
<td>38. We are doing well enough in this school in math not to need tutors.</td>
<td>4</td>
<td>3</td>
<td>2</td>
</tr>
<tr>
<td>39. We have enough time built into the schedule to teach math effectively.</td>
<td>4</td>
<td>3</td>
<td>2</td>
</tr>
</tbody>
</table>

*Site-based Professional Learning:* “Professional Learning” refers to the perceived usefulness and ease of application of knowledge gained to enhance instructional delivery.

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>40. Site-based professional learning can produce immediate gains in teacher quality.</td>
<td>4</td>
</tr>
<tr>
<td>41. Improving teacher knowledge and teaching skills in mathematics is essential to raising student achievement.</td>
<td>4</td>
</tr>
<tr>
<td>42. Site-based professional learning workshops I attended were helpful in developing lessons using Bloom’s Taxonomy in teaching math.</td>
<td>4</td>
</tr>
<tr>
<td>43. Site-based professional learning activities that I attended helped me in planning motivational lessons in math.</td>
<td>4</td>
</tr>
<tr>
<td>44. It was easy to apply what I was presented in the math workshops in my class.</td>
<td>4</td>
</tr>
<tr>
<td>45. Site-based professional learning provided specific information in math on the areas I needed for improvement.</td>
<td>4</td>
</tr>
</tbody>
</table>
Appendix E (continued)

Please circle only one response for each statement

<table>
<thead>
<tr>
<th>Strongly Agree – 4</th>
<th>Agree = 3</th>
<th>Disagree – 2</th>
<th>Strongly Disagree – 1</th>
</tr>
</thead>
<tbody>
<tr>
<td>46. The time commitment that site-based professional learning activities require impacts academic performance.</td>
<td>4 3 2 1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>47. I am satisfied with the programs that our site-based professional</td>
<td>4 3 2 1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>48. Site-based professional learning activities/trainings that I attend provide me with new information on innovating learning strategies.</td>
<td>4 3 2 1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>49. Most of the faculty members I have contact with in grade-level meetings are genuinely interested in students and discuss their students’ improvement.</td>
<td>4 3 2 1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>50. I am satisfied with the assistance I receive from site-based professional learning.</td>
<td>4 3 2 1</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**General Information**

51. What is your gender?
   - Male [ ]  Female [ ]

52. What is your highest degree?
   - BA/BS [ ]  MA/MS [ ]  Ed.S [ ]  Ph.D/Ed.D [ ]

53. What is your age range?
   - 22-29 [ ]  30-39 [ ]  40-49 [ ]  50+ [ ]

54. What grade do you teach?
   - 6th [ ]  7th [ ]  8th [ ]  6th & 7th [ ]  7th & 8th [ ]  6th, 7th, & 8th [ ]

55. How many years have you taught?
   - 1-5 [ ]  6-10 [ ]  11-15 [ ]  16-25 [ ]  26+ [ ]

56. I use flexible group _____ percent of the time.
   - 0-44% [ ]  45-69% [ ]  70-100% [ ]

57. Where did you do your teacher preparation?
   - College/University [ ]  Alternative Teacher Preparation Program [ ]
REFERENCES


*Journal for Research in Mathematics Education, 22, 3-29.*


*Educational Leadership, 46, 68-70.*


