The basic function calculator and factors of other variables that may impact achievement on the Georgia math CRCT for students with disabilities

Willie M. White-Martin
Clark Atlanta University

Follow this and additional works at: http://digitalcommons.auctr.edu/dissertations
Part of the Education Commons

Recommended Citation
White-Martin, Willie M., "The basic function calculator and factors of other variables that may impact achievement on the Georgia math CRCT for students with disabilities" (2013). ETD Collection for AUC Robert W. Woodruff Library. Paper 746.
THE BASIC FUNCTION CALCULATOR AND FACTORS OF OTHER VARIABLES THAT MAY IMPACT ACHIEVEMENT ON THE GEORGIA MATH CRCT FOR STUDENTS WITH DISABILITIES

Committee Chair: Dr. Moses Norman

Dissertation dated December 2013

This study is a quantitative analysis of the performance of seventh grade students with disabilities on the state standardized mathematics test, the Georgia Math Criterion Referenced Competency Test (CRCT), across a three-year period. Information pertinent to the outcome of this study was gathered at an urban middle school in Atlanta, Georgia with an enrollment of approximately 800 students. The research was designed to determine whether or not the basic function calculator was a viable intervention for students with disabilities on the Georgia Math CRCT.

The sample for this study identified 52 seventh graders with disabilities and 11 math educators at one Atlanta urban middle school. Several variables were identified in this study. Statistical relationships between the dependent variable of student achievement and several independent student and teacher-relevant variables were quantitatively analyzed with the utilization of the Statistical Package for the Social
Sciences (SPSS) through independent samples $t$-tests, Pearson correlations, one-way analysis of variance, and cross tabulations.

Based on the findings, implications and conclusions of this study, suggested recommendations are provided to educational stakeholders that include policy makers, educators, school leaders, and parents. Thus, recommendations of this study are for the aspects of student performance to improve student achievement in mathematics for students with disabilities through instructional deliveries, effective systems of communications between teachers and parents, and the perspectives of professional practices of math educators as found in this study.
THE BASIC FUNCTION CALCULATOR AND FACTORS OF OTHER VARIABLES THAT MAY IMPACT ACHIEVEMENT ON THE GEORGIA MATH CRCT FOR STUDENTS WITH DISABILITIES

A DISSERTATION SUBMITTED TO THE FACULTY OF CLARK ATLANTA UNIVERSITY IN PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR THE DEGREE OF DOCTOR OF EDUCATION

BY

WILLIE M. WHITE-MARTIN

DEPARTMENT OF EDUCATIONAL LEADERSHIP

ATLANTA, GEORGIA

DECEMBER 2013
ACKNOWLEDGMENTS

I can truly say that this task has allowed me to appreciate the prayers and words of encouragement from family members and friends close to my heart who also understood the importance of time and space I needed to focus, think, and write. Above all, I thank my God and Creator for his strength, peace and comfort given to me to continue to this end. My most sincere thanks to my husband, Earnest for your patience and loving kindness, my two daughters and two sons, my brother, two sisters, and sister-in-law—you all are the best ingredients for a family. To my mom, dad, and brother Bernie, smiling from heaven, I can still hear you speaking to my spirit, “Go ahead and finish.” Sincere thanks to my church family for your understanding—when in the depth of my heart, I knew I needed to be there. A special thank you to all my committee members: Dr. Norman, my committee chairperson for your advice and setting me on the right track of organizing, planning, and conducting my study; Dr. Turner for your statistical and data collection guidance and orientation; Dr. Hill for stepping up and joining the crusade as a supportive team member; Mrs. Cooke, thank you for your precious words of encouragement that kept me together when I thought I was almost in pieces; and to all the professors of the Educational Leadership Department of Clark Atlanta University, it is sincerely a blessing just knowing that you were there whenever I needed you. Finally, to my group of supportive friends, thank you for being true friends. God bless every one of you and, thank you again for helping me to accomplish this goal.
# TABLE OF CONTENTS

<table>
<thead>
<tr>
<th>ACKNOWLEDGMENTS</th>
<th>ii</th>
</tr>
</thead>
<tbody>
<tr>
<td>LIST OF FIGURES</td>
<td>vi</td>
</tr>
<tr>
<td>LIST OF TABLES</td>
<td>vii</td>
</tr>
</tbody>
</table>

## CHAPTER

### I. INTRODUCTION ................................................................. 1
- Statement of the Problem .................................................. 5
- Purpose of the Study ....................................................... 6
- Research Questions ....................................................... 9
- Significance of the Study ............................................... 11
- Summary ........................................................................... 15

### II. REVIEW OF RELATED LITERATURE ...................................... 17
- Specific Learning Disability ............................................... 18
- Other Health Impairments ............................................... 19
- Emotional Behavior Disorders ......................................... 20
- Federally Regulated Accommodations .................................. 20
- Inclusion of Students with Disabilities on Standardized Tests  24
- Dyscalculia and Calculators on High-Stakes Tests .............. 27
- Summary ........................................................................... 31

### III. THEORETICAL FRAMEWORK ........................................... 35
- Research Design ............................................................. 35
- Theory of Variables ....................................................... 35

iii
<table>
<thead>
<tr>
<th>CHAPTER</th>
<th>PAGE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Definition of Variables</td>
<td>49</td>
</tr>
<tr>
<td>Definition of Relevant Terms</td>
<td>51</td>
</tr>
<tr>
<td>Relationship among Variables</td>
<td>55</td>
</tr>
<tr>
<td>Limitations of the Study</td>
<td>56</td>
</tr>
<tr>
<td>Summary</td>
<td>58</td>
</tr>
<tr>
<td>IV. RESEARCH METHODOLOGY</td>
<td>59</td>
</tr>
<tr>
<td>Research Design</td>
<td>59</td>
</tr>
<tr>
<td>Description of the Setting</td>
<td>66</td>
</tr>
<tr>
<td>Sampling Procedures</td>
<td>67</td>
</tr>
<tr>
<td>Working with Human Subjects</td>
<td>69</td>
</tr>
<tr>
<td>Instrumentation</td>
<td>69</td>
</tr>
<tr>
<td>Participants/Location of Research</td>
<td>71</td>
</tr>
<tr>
<td>Data Collection Procedures</td>
<td>72</td>
</tr>
<tr>
<td>Coding Procedures</td>
<td>74</td>
</tr>
<tr>
<td>Statistical Applications (Quantitative)</td>
<td>77</td>
</tr>
<tr>
<td>Summary</td>
<td>78</td>
</tr>
<tr>
<td>V. ANALYSIS OF THE DATA</td>
<td>80</td>
</tr>
<tr>
<td>Data Analysis in Response to Research Questions</td>
<td>83</td>
</tr>
<tr>
<td>VI. FINDINGS, CONCLUSIONS, IMPLICATIONS, AND RECOMMENDATIONS</td>
<td>102</td>
</tr>
<tr>
<td>Problem in Context</td>
<td>102</td>
</tr>
</tbody>
</table>
Table of Contents (continued)

<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Review of Related Literature</td>
<td>103</td>
</tr>
<tr>
<td>Theoretical Framework</td>
<td>104</td>
</tr>
<tr>
<td>Research Methods</td>
<td>106</td>
</tr>
<tr>
<td>Statistical Findings</td>
<td>107</td>
</tr>
<tr>
<td>Specific Findings</td>
<td>112</td>
</tr>
<tr>
<td>Conclusions</td>
<td>116</td>
</tr>
<tr>
<td>Implications</td>
<td>116</td>
</tr>
<tr>
<td>Limitations of the Study</td>
<td>117</td>
</tr>
<tr>
<td>Recommendations</td>
<td>118</td>
</tr>
<tr>
<td>Summary</td>
<td>121</td>
</tr>
</tbody>
</table>

**APPENDIX**

A. Demographics: Urban Middle School as of 2011 Profiles Report ......... 124
B. Urban Middle School CRCT Performance Levels ............................. 125
C. Survey/Questionnaire ............................................................ 126
D. Informed Consent ..................................................................... 128
E. Data Collection and Analysis Form .......................................... 130

REFERENCES ................................................................................. 131
LIST OF FIGURES

<table>
<thead>
<tr>
<th>FIGURE</th>
<th>PAGE</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Conceptual Model of Theoretical Framework</td>
<td>39</td>
</tr>
<tr>
<td>2. List of Variables Relevant to Study</td>
<td>41</td>
</tr>
<tr>
<td>TABLE</td>
<td>PAGE</td>
</tr>
<tr>
<td>-------</td>
<td>------</td>
</tr>
<tr>
<td>1. Highlighted Studies within the Literary Review</td>
<td>33</td>
</tr>
<tr>
<td>3. Math CRCT Scores With and Without Basic Function Calculator</td>
<td>82</td>
</tr>
<tr>
<td>4. Seventh Graders with Disabilities: With and Without Access to the Basic Function Calculator on the Math CRCT</td>
<td>84</td>
</tr>
<tr>
<td>5. Independent Samples Test: CRCT Scores With and Without Basic Function Calculator on the Math CRCT</td>
<td>85</td>
</tr>
<tr>
<td>6. Math CRCT Scores of Seventh Graders across a 3-Year Span</td>
<td>86</td>
</tr>
<tr>
<td>7. Seventh Grade Students with Learning Disabilities on the Math CRCT across the 2009-2010, 2010-2011, and 2011-2012 School Years</td>
<td>87</td>
</tr>
<tr>
<td>8. Independent Samples Test: Students with Learning Disabilities with and without Access to the Basic Function Calculator</td>
<td>88</td>
</tr>
<tr>
<td>9. Students with Other Health Impairments with and without Access to the Basic Function Calculator on the Math CRCT</td>
<td>90</td>
</tr>
<tr>
<td>10. Independent Samples Test: Students with Other Health Impairments with and without Access to the Basic Function Calculator on the math CRCT</td>
<td>90</td>
</tr>
<tr>
<td>11. ANOVA: CRCT Scores by Student Attendance</td>
<td>92</td>
</tr>
</tbody>
</table>
List of Tables (continued)

<table>
<thead>
<tr>
<th>TABLE</th>
<th>PAGE</th>
</tr>
</thead>
<tbody>
<tr>
<td>12.</td>
<td>Correlations: CRCT Scores and Final Math Grades</td>
</tr>
<tr>
<td>13.</td>
<td>Performance of Male and Female Students with Disabilities on the Math CRCT</td>
</tr>
<tr>
<td>14.</td>
<td>Independent Samples Test: Performance by Gender of Students with Disabilities on the Math CRCT</td>
</tr>
<tr>
<td>15.</td>
<td>Correlations: CRCT Scores and Student Socioeconomic Status (SES)</td>
</tr>
<tr>
<td>17.</td>
<td>Cross Tabulation: Staff Development by Teacher Qualifications</td>
</tr>
<tr>
<td>18.</td>
<td>Cross Tabulation: Parental Involvement by Teacher Qualifications</td>
</tr>
</tbody>
</table>
CHAPTER I
INTRODUCTION

State annual assessments are used by school districts across the United States and are believed to be the best method to measure student performance and achievement. Since 2001, the federal enactment of the law, No Child Left Behind (NCLB), has set the precedence for student achievement. Local departments of education, school districts, and school agencies have been charged with accountability guidelines that measure the progress of elementary and secondary students. In compliance with NCLB, the Georgia Department of Education (GaDOE) developed the Criterion Referenced Competency Test (CRCT or GCRCT) as a standardized performance-based assessment aligned to the curriculum of core subjects that include mathematics, reading, English language arts, science and social studies. The CRCT is administered once a year to all Georgia public school students in elementary and middle schools enrolled in grades 1 through 8.

Ideally, students across various cultural backgrounds, racial identities, economical status, and intellectual abilities are required by NCLB to participate in statewide assessments across the United States, and to demonstrate grade-level proficiency in math and reading. It is important to note that students are also required to demonstrate proficiency in English language arts, science, and social studies but, math and reading are the primary assessments areas used to gauge student achievement. The NCLB requirements to demonstrate proficiency are the same for students with disabilities in
spite their struggles to perform academic standards in core subject areas as a result of learning difficulties, attention deficits, chronic illnesses, and even emotional disturbances. However, the Georgia Accommodations Manual (GAM) has provisions of accommodations and systems of supports that are designed to remedy performance challenges for students with disabilities and increase scholastic achievement (GaDOE, 2008). The manual is a state-regulated guide that lists and describes types of supports and conditions that allow students with disabilities access to accommodations during state assessments (GaDOE, 2008). One state-regulated accommodation is the conditional usage of the basic function calculator which is set aside for students with disabilities on the CRCT and other state-wide assessments. The basic function calculator is used to compute mathematical expressions on state assessments such as the math CRCT. Its primary operations are addition, subtraction, multiplication, and division. The basic function calculator is unlike the scientific and graphing calculators which are able to graph linear equations, convert units of measures and perform exponential and mathematical functions.

The GAM sets guidelines that regulate various types of support systems that are available to eligible students with disabilities during classroom instruction and state standardized assessments (GaDOE, 2008). According to the GAM, accommodations are not designed to alter the validity or the purpose of an assessment but, rather to adjust the manner or the delivery of an assessment (GaDOE, 2008). The 2008 manual identifies four categories of accommodations: (a) presentation, (b) setting, (c) response, and (d) scheduling to eligible students with written individualized education programs (IEPs).
The basic function calculator accommodation is categorized as a response accommodation. Students eligible to use the basic function calculator as a response accommodation during standardized assessments, must meet two conditions according to the state department of education: (a) students must have a specific disability that severely limits or prevents them the ability to calculate mathematically, even after several attempts to teach the students to do so, and (b) the students must use the basic calculator for classroom instruction for access to mathematical calculation (GaDOE, 2008).

Specific accommodations must be indicated in a student’s IEP. Each student represented in this study has been identified with a disability and has a current written IEP. A series of psychological tests are also used to determine the areas of eligibility a student qualifies for special education services. Upon determination that a student is eligible for special education services, an IEP is written to provide educational services for students as indicated in the psychological results.

This study compares the math CRCT performance of seventh grade students with disabilities with access to the basic function calculator accommodation and without access to the accommodation of the basic function calculator. CRCT scores of both students with and without access to the calculator will be collected and compared using numerical data associated with a quantitative design, according to Creswell (2009). Analysis of the data determined whether or not the basic function calculator was a viable intervention for student achievement on the math CRCT. In addition to the basic function calculator, data were collected to determine the relationship between student performance on the math CRCT and other student-relevant variables that include
disability types, gender, daily attendance, final numeric math grades, and socioeconomic status.

A questionnaire-survey based on Likert's (1932) scale was used to collect information about specific variables that describes the perspectives of math teachers. The information was analyzed in a quantitative design as described by Creswell (2009). The collected information was used to determine the relationship between teacher quality and professional practices that may impact student achievement such as collaborative planning, staff development, and parental involvement.

Previous studies that are relevant to accommodations on standardized tests have suggested inconsistent and controversial findings because there are many types of accommodations and various means of implementations that are designed to fit the needs of students with disabilities (Sireci, Scarpati, & Li, 2005). However, other studies suggest calculator accommodations have been found to have a positive impact on the performances of students with disabilities, and ultimately have led to the increase of scores on standardized tests (Elliott & Roach, 2002).

Accommodations are mandated by the Individuals with Disabilities Education Act (IDEA). IDEA was first enacted as PL 94-142 or The Education for All Handicapped Children Act (EAHCA) of 1975. Since 1975, the law has had eight amendments and reauthorizations. The first amendment occurred in 1986 (PL 99-457); then, twice in 1990 (PL 101-336 and PL 101-476); 1991 (PL 102-119); 1997 (PL 105-17); 2001 (PL 107-110); 2004 (PL 108-446), and finally, 2008 (PL 110-325) (ED.gov. OSEP) (Schafer, 2011). In all its reauthorizations, the main objective of IDEA is to provide equal
educational opportunities and access through accommodations to students with disabilities in public school settings alongside peers without disabilities.

**Statement of the Problem**

The basic function calculator (BFC) is a conditional accommodation for Students with Disabilities (SWD) on the Georgia Math CRCT (GaDOE, 2008). If the BFC were not a conditional accommodation, more students with disabilities would score the minimum requirement of 800 on the math CRCT and thus, more students with disabilities would demonstrate achievement on the statewide standardized test. Since 2001, students with disabilities have been required by federal law NCLB to participate in annual state-mandated assessments and to demonstrate grade level proficiency in mathematics and other core subjects. The intervention of the basic function calculator accommodation should be made available for all students with disabilities to allow a better opportunity to meet the minimum performance requirement of a passing score of 800 on the annual Georgia Math CRCT. Without the accommodation of the calculator on the math CRCT, it is more difficult for students with disabilities to achieve minimum passing scores. Consequently, under Georgia’s regulated accommodations provisions, the usage of the basic function calculator is a conditional provision during state-mandated assessments such as the CRCT (GaDOE, 2008) thus, access is not provided to all students with disabilities.

This study looks at the math CRCT scores of seventh graders with specific learning disabilities, emotional behavioral disturbances, and other health impairments across a 3-year assessment period that includes the 2009–2010, 2010–2011, and 2011–
2012 academic school years. The study is designed to determine whether the basic function calculator accommodation is a viable intervention for the achievement of students with disabilities on the Georgia Math CRCT and, whether there are other student-relevant variables that may impact math CRCT scores for the sample of students with disabilities in this study.

Math educators or teachers of students with and without disabilities are required to participate in professional practices to ensure opportunities for student achievement. However, teachers are seldom asked to state their perspectives on certain practices. This study was conducted to determine whether there are teacher-relevant variables that may be relevant to student achievement on the math CRCT. This study is set across an urban middle school in the Atlanta metropolitan area.

Purpose of the Study

The primary purpose of this study is to determine whether or not the basic function calculator is a viable intervention for student achievement on the math CRCT for seventh grade students with disabilities. Student-relevant and teacher-relevant variables were analyzed in this study to determine the impact on student achievement in regard to the math CRCT. The analyses of this study are a quantitative design with numerical data in a comparative approach (Creswell, 2009). In this approach, math CRCT scores of students with learning disabilities, emotional behavioral disturbances, and other health impairments are compared with access and without access to the accommodation of the basic function calculator as an intervention for student achievement. Additionally, the analysis evaluates the performance of students with
disabilities based on other variables that include gender, end of semester numeric math grade, the number of days absent during the course of a school year, and the free and reduced lunch status of students to determine the relationship to student achievement. Finally, data were collected through a survey-questionnaire to determine the perspectives of math teachers in cross tabulations between teacher quality and opinions of professional practices that may impact student achievement. Math teachers’ perspectives were based on the following independent variables: teacher quality, collaborative planning, staff development and parental involvement.

The data were accessed through the district’s electronic and manual archived reporting systems. A quantitative approach was used to conduct a statistical analysis with the usage of the software program "Statistical Package for the Social Sciences 17.0" (SPSS) to determine the outcome of student achievement as this study is proposed. As stated above, data of student variables consist of the students’ disabilities, gender, attendance, math grades that reflect classroom performance, assignments, projects, and teacher-made tests, and the socioeconomic status of students in respect to free and reduced lunch. Student data retrieved were used to determine whether or not there is a relationship between student achievement on the Math CRCT and other relevant variables identified in this study for seventh grade students with disabilities.

In this study, seventh grade students with disabilities were administered the same standardized math CRCT as with their non-disabled peers. However, some students with disabilities met the conditions as stated in the GAM to have access to the basic function calculator accommodation on the CRCT statewide assessment. Students with access to
the basic function calculator on the math CRCT have the accommodation specified and written in their Individualized Education Program (IEP). Students without the access of the basic function calculator on the math CRCT did not have the accommodation specified and written in their IEP. This study determined whether or not there is a significant difference between math CRCT scores obtained by students with disabilities with and without the accommodation of basic function calculator.

It is important to note that each student participant of this study had an IEP as required by federal law IDEA. An IEP is a legal document that specifies the educational supports and services students with disabilities are to receive in the learning and testing environments to meet academic goals. Thus, any type of accommodation such as the basic function calculator was identified and documented or written in the student’s IEP. However, the IEP is not a common document that suits the identical needs and conditions of all students with disabilities. In other words, not all students with disabilities receive the same types of services supports, and accommodations; rather, services and accommodations are provided to meet the needs of students according to the eligibilities and requirements of their disabilities.

Findings of this study determined the significance of the basic function calculator accommodation as a viable intervention on the math CRCT for seventh grade students with disabilities across an urban middle school. Results of this study were also be used to determine the relationship between student-relevant factors and student achievement on the math CRCT and, the relationship between teacher quality and professional practices
according to the perspectives of the math teachers at the urban middle school identified in
this study.

Research Questions

The following research questions were relevant to this study and pertain to
outcome of student achievement with and without access to the basic function calculator
accommodation.

RQ1: Is there a significant difference in the performance of seventh grade
students with disabilities on the math CRCT between those with access
to the basic function calculator and those without access?

RQ2: Is there a significant difference between the performance of seventh
grade students with disabilities on the math CRCT with and without
access to the basic function calculator across three school years: 2009–

RQ3: Is there a significant difference between the performance of seventh
grade students with learning disabilities on the math CRCT with and
without access to the basic function calculator across the 2009–2010,
2010–2011, and 2011–2012 school years?

RQ4: Is there a significant difference between the performance of seventh
grade students with emotional behavioral disturbances on the Math
CRCT with and without access to the basic function calculator across the
RQ5: Is there a significant difference between the performance of seventh grade students with other health impairments on the math CRCT with and without access to the basic function calculator across the 2009–2010, 2010–2011, and 2011–2012 school years?

The following research questions were relevant to this study and pertain to the relationship between student-relevant variables and the outcome of student achievement:

RQ6: Is there a significant relationship between student attendance and student achievement on the math CRCT for seventh grade students with disabilities?

RQ7: Is there a significant relationship between the final numeric classroom grade in mathematics and student achievement on the math CRCT for seventh grade students with disabilities?

RQ8: Is there a significant difference between the performance of male and female seventh grade students with disabilities on the math CRCT?

RQ9: Is there a significant relationship between the socioeconomic status of free and reduced lunch and student achievement for seventh grade students with disabilities on the math CRCT?

The following research questions were relevant to this study and pertain to the relationship between teacher-relevant variables and the outcome of student achievement:

RQ10: What is the quality of the sampled certified mathematics teachers at the urban middle school identified in this study?
RQ11: What is the relationship between teacher qualifications and teacher collaborative planning sessions according to the perspectives of math teachers at the urban middle school?

RQ12: What is the relationship between teacher qualifications and staff development experiences according to the perspectives of math teachers at the urban middle school?

RQ13: What is the relationship between teacher qualifications and parental involvement according to the perspectives of math teachers at the urban middle school?

**Significance of the Study**

This study is significant for the benefit of policy makers, educators, and parents as knowledge and information are contributed to the literature as to whether or not the accommodation of the basic function calculator is a viable intervention for seventh grade students with disabilities on the Georgia Math CRCT. The analyses include the relationships between student achievement and student-relevant variables by disability types, student attendance, final classroom numeric math grade, gender, and socioeconomic status of free and reduced lunch. The relationships between teacher qualifications and teacher-relevant variables—collaborative planning, staff development, and parental involvement—will benefit educational leaders and educators as recommendations are provided for the improvement of classroom instructional methods and facilitation of professional practices for math teachers that may impact student achievement on the Georgia Math CRCT.
This study will also have significance for parents of students with disabilities as parents will have the awareness that the basic function calculator is an available accommodation that may increase student achievement on annual statewide assessments. It is important to note that findings of this study were based on the analyses of each student-relevant variable in relationship to student achievement on the math CRCT with and without access to the accommodation of the basic function calculator for students with disabilities, and the analyses of the relationships between teacher qualifications and teacher-relevant variables based on the perspectives of math teachers at the identified urban middle school in this study.

State policy makers and legislators will find significance in this study as decisions are considered that regulate guidelines for standardized test accommodations on statewide assessments for students with disabilities. For example, GAM guidelines stipulate that the basic function calculator is a conditional accommodation that is available to students with disabilities under specific conditions on the math CRCT (GaDOE, 2008). However, it is the empirical knowledge of the researcher that as students with disabilities matriculate through upper grade levels, math performance standards become more increasingly rigorous. Thus, policies are needed that will implicate the change of current state guidelines for accommodations that regulate access of the basic function calculator from conditional to unconditional access for students with disabilities on the math CRCT. This change in policy is believed practical to provide equal opportunity for student achievement for students with disabilities alongside non-disabled peers.
Math teachers, both general and special educators may find relevant information in this study that is significant to the usage and selection process of the basic function calculator accommodation for students with disabilities for the purpose of the math CRCT. Information in regard to the usage of the accommodation may be considered relevant as educators seek viable means within state guidelines to increase achievement for students with disabilities on math assessments. Furthermore, educators may find significance in this study as achievement results of students with disabilities are compared with and without access to the basic function calculator on the math CRCT. Finally, educators may consider this study significant as accommodations are selected at IEP meetings to provide support in mathematics for students with disabilities during classroom instructional time and standardized testing for the benefit of student achievement.

Occasionally, general educators deliver mathematics instructions to students with disabilities in classroom settings without the presence of a math special educator. Thus, this study is significant to general educators to inform that the basic function calculator is permitted in accordance to the IEP as an accommodation available to students with disabilities to minimize mathematical difficulties encountered by students with the operations of addition, subtraction, multiplication, and division in the learning environment. General educators have the need to know that the access to the calculator accommodation is intended for the adjustment of classroom instructions for students with disabilities in mathematics and other subject areas as needed.
Parents of students with disabilities will find significance in this study as they are enlightened that the basic function calculator is an available accommodation that may be a factor that constitutes success on the state mandated math CRCT. This study may be significant to parents as other relevant factors may be identified that may increase student achievement on the math CRCT for students with disabilities. It is believed that this study is worthwhile as an information source for both parents and students with disabilities due to its significance in regard to the basic function calculator accommodation as a possible impact on student achievement.

Finally, educational leaders often are more focused on the overall operation of the local school building and unaware of simple constructs that are provided and linked to the achievement of students with disabilities on standardized tests. Thus, this study is significant for educational leaders and administrators in terms of the perspectives of math teachers about certain teacher-relevant variables identified as professional practices in relationship to teacher qualifications which may be significant to student achievement. It is vital that educational leaders are aware of teacher perspectives in regard to factors that may influence student achievement and prepare to make adjustments in the areas of collaborative planning, staff development, and parental involvement for the benefit of the academic health of the school.

Overall, this study is significant to individuals who are at the core of student progress, student performance, and the academic achievement of students with disabilities. Thus, this study is significant as it provides information that may determine whether the basic function calculator accommodation is a viable intervention during the
state standardized assessments of the math CRCT. Additionally, it is relevant that all parties know that accommodations allow adjustments in classroom instructions and required assessments for students with disabilities in mathematics and other core subject areas. It must be noted that with proper utilization of accommodations, students with disabilities are better prepared to demonstrate academic achievement and, move forward along with nondisabled peers toward the national goal of closing achievement gaps.

Summary

In Chapter I, a brief history about federal laws that govern student participation and performance in state mandated assessments is discussed. The chapter also discusses the problem statement of the study, the purpose of the study, research questions that pertain to the study and, the significance of the study.

Ideally, students with disabilities and without disabilities are required by the federal law NCLB of 2001 to participate in standardized state assessments of core subjects that measure academic performance and student achievement. However, IDEA of 2004 stipulates that various types of accommodations are allowable for students with disabilities during standardized assessments and, those specific accommodations must be written in the students’ IEPs (Luke & Schwartz, 2007). Thus, students with disabilities as their non-disabled peers, participate in state standardized assessments with accommodations to attain the minimum score requirement of 800 on the math and other portions of the GCRCT.

Accommodations are provided to minimize educational challenges of students with disabilities during statewide assessments. Consequently, all students with
disabilities are not eligible for the same accommodations rather accommodations are provided according to the educational needs of students with disabilities. Accommodations are mandated by IDEA of 2004 and must be documented in the student IEP. Accommodations address the needs of students with disabilities in the areas of presentation, response, setting, and timing or scheduling. It is essential that all concerned parties are familiar with federal guidelines and state-approved accommodations that are available to support students with disabilities. With proper utilization of state-approved accommodations, student achievement becomes a win-win event as students with disabilities are able to demonstrate proficient outcomes on required state standardized assessments which have become the flagships or tools to measure student achievement for districts, elementary, and secondary schools.
CHAPTER II

REVIEW OF RELATED LITERATURE

Research in the field of education has provided findings that pertain to relative topics on the performance of students with disabilities on high stakes tests. These findings are pertinent disclosures of documented empirical studies that are relevant to the basis of this study on the outcome of the Georgia CRCT mathematics section of students with disabilities with the basic function calculator when compared to nondisabled peers on the same test. The research engine Galileo was provided through the Robert W. Woodruff Library of the Atlanta University Center to explore results of connected and relevant findings for this study. Basic and advanced searches were conducted with usage of a variety of key words that complemented this study through on-line databases such as ERIC Education at EBSCOhost, Google Scholar, JSTOR – The Journal Project, ProQuest databases and others that include numerous websites, professional and scholarly journals, articles, and reviews.

The review of literature represents a disclosure of research findings that pertain to the performances of students with disabilities on state standardized assessments. The studies reviewed are inclusive of discussions on the following: (a) specific learning disability, (b) other health impairment, (c) emotional behavioral disturbances, (d) federally regulated accommodations, (e) inclusion of students with disabilities on standardized tests, (f) dyscalculia and students with disabilities, (g) the learning
expectations for students with disabilities according to NCLB, and (h) instructional strategies and learning styles of students with disabilities.

**Specific Learning Disability**

According to the literature, the term *Specific Learning Disability* or more commonly, *learning disability* is widely known by its IDEA definition as a disorder in one or more basic psychological processes involved in understanding or in using language, spoken or written, that may manifest itself in an imperfect ability to listen, speak, read, write, spell, or to do mathematical calculations (Knoblauch & Sorenson, 1998). Learning disability is one among 13 eligible categories of disabilities acknowledged by IDEA. According to Reschly (2002), the nature of the learning disability is not of a biological anomaly but, best considered to be categorized of a social system high-incidence disability. Other disabilities categorized by Reschley’s *high-incidence* disability of specific learning disability are: (a) mild mental retardation (MR), (b) emotional disturbance (ED), (c) speech-language (Sp/L) disabilities, and (d) attention deficit hyperactivity disorder (ADHD). Collectively, high-incidence disabilities account for more than 85% of all students age 6 to 17 with disabilities served in special education programs in U.S. schools, according to the aforementioned 2002 study. Statistics in a wider spectrum revealed in a 2003 seminar-article that learning disability affects up to 2.5% of the general population in the Western population (Gillberg & Soderstrom, 2003). Although, Gillberg and Soderstrom clearly do not provide a definition for specific learning disability, the authors conclude it is a label that applies to individuals who consistently test below a certain intelligence quotient (IQ) level—usually 70 or below,
and demonstrate functional impairment. Reschly (2002) further acknowledges that specific learning disabilities are most commonly diagnosed in 6% of school-aged children, and more than one half the students served in special education.

Mercer, Jordan, Allsopp, and Mercer (1996) conducted a study that engaged all 50 state departments of education in a survey to determine a consensus for the definition of specific learning disabilities. The results of the 1996 study state that 94% of the surveyed states’ definition had inclusive verbiage as IDEA’s 1997 definition in terms of psychological processing, language, and academic achievement in reading, writing, and arithmetic; while other states are in debate about definitions that will have a noncategorical approach.

**Other Health Impairments**

Children with the eligibility of other health impairment (OHI) are eligible for educational services under IDEA 2004. According to the IDEA, a clear and concise definition for other health impairments in children is limited strength, vitality or alertness, or a heightened alertness to environmental stimuli that create interferences with respect to the educational and learning environments (National Dissemination Center for Children with Disabilities [NICHCY], 2009). The disability of other health impairment or OHI includes medical or health conditions noted as: attention deficit disorder, attention deficit hyperactive disorder, diabetes, cancer, autoimmune deficiency disorder (AIDS), asthma, epilepsy, sickle cell anemia, lead poisoning, heart conditions, and other illnesses which may have a direct impact on the academic performance or educational stability of a child (Oswalt, 2010).
Emotional Behavior Disorders

The National Dissemination Center for Children with Disabilities (NICHCY) defines the term emotional disturbance in compliance with IDEA (PL 94-142) as the condition that exhibits at least one of five characteristics having the following inabilities: (a) to learn without the explanation of intellectual, sensory or health factors; (b) to build or maintain satisfactory interpersonal relationships with peers and teachers; (c) to exhibit appropriate types of behavior or feelings under normal circumstances; (d) to suppress a pervasive mood of unhappiness or depression; and (e) to cope with physical symptoms or fears associated with personal or school problems (NICHCY, 2010).

The performance of students with emotional/behavioral disturbance (EBD) on the GCRCT-Mathematics section is incorporated with this study. According to a 2009 study that appeared in the Behavioral Disorders Journal, very little information is available that reflects the performances of children with emotional disorders on state assessments, such as the standards-based GCRCT (Carr-George, Davis, Vannest, & Willson, 2009). Rather, more studies have been done that report the rates of participation of children identified with EBD on statewide assessments, according to the same study. This current study will add to the set of information that specifies the performances of students identified with emotional disorders on state standardized assessments.

Federally Regulated Accommodations

Students who are identified with disabilities through a series of psychological and achievement batteries are eligible under federal guidelines of the reauthorized IDEA (1997, 2004) to receive accommodations to reduce the stigma of the students' disabilities.
In other words, accommodations are designed to remove the effects of a disability that interfere with the measurable academic success of students and provide opportunities to demonstrate student achievement that is comparable to the success of students without disabilities. Literature in respect to IDEA indicates accommodations are adaptations that refer to the educational environment, the presentation of educational material, the method of response or the educational content [during instruction, classroom and statewide testing] (Federal Register, 2006). Any student with a disability is required to have the recommended accommodations for instruction, classroom environment, and testing written within the IEP. According to Salend (2008), testing accommodations should parallel regularly used classroom instructional accommodations. Individual state departments of education set standards for school districts that monitor and regulate approved accommodations in accordance to federal guidelines during statewide assessments.

The National Center for Learning Disabilities (NCLD) defines accommodations as alterations in the way tasks are presented that allow children with learning disabilities to complete the same assignments as other students. According to the definition, accommodations do not alter the content of assignments nor change what tests are intended to measure. Rather, accommodations make it possible for students with [learning] disabilities to show what they are capable of achieving without being impeded by their disability (NCLD, 2006.) Thurlow (2005) reports that the utilization of state-regulated accommodations has the intent to minimize cognitive and learning barriers that strain the performances of students with disabilities on standardized assessments.
The Georgia Department of Education determined a set of 39 “allowable” types of accommodations in its 2008 GAM publication that are outlined for students with disabilities at statewide assessments that include the CRCT (GaDOE, 2008). Georgia’s accommodations are also categorized into four groups: (a) setting, (b) presentation, (c) response, and (d) scheduling. For the purpose of this study, the utilization of the number 32 accommodation in the GAM—the basic function calculator or adapted basic calculator accommodation—falls under the response type in the GAM is the focus of this study. The accommodation is identified in this study as a variable accessed by some seventh grade students with disabilities on the math CRCT assessment. Stipulations and conditions for the assignment of the basic function calculator as an accommodation are stated in Chapter I.

Studies that measured student performance on standardized assessments report widespread usage of accommodations for students with disabilities is a method to increase the probability of the state’s Adequate Yearly Progress (AYP), and to define student proficiency in certain core subjects. According to Shaul, and Ganson (2005), the 1994 Improving America’s Schools Act was expanded as the 2001 NCLB Act and, thus all students—even those in “subgroups,” particularly: (a) economically disadvantaged, (b) major racial and ethical groups, (c) disabled or with disabilities, and (d) limited in the English language—are required to demonstrate 100% proficiency in all academic areas by 2014. Shaul and Ganson further implied that NCLB’s 100% proficiency requirements has prompted educational state departments to create alternative methods to close achievement gaps between the disadvantaged and advantaged peers, and improve the academic performances of all children.
Consequently, research states testing accommodations raise a fine line and, it is the responsibility of educators, and test administrators to consider a few questions when there is the need to determine whether or not testing accommodations are valid or invalid for the recipient student with a disability (Phillips, 1994). Phillips poses the following questions for educators and test administrators:

- Will format changes or alterations in testing conditions change the skill being measured?
- Will the scores of examinees tested under standard conditions have a different meaning than scores for examinees tested with the requested accommodations?
- Would examinees without disabilities benefit if allowed the same accommodation?
- Does the disabled examinee have any capability for adapting to standard test administration conditions?
- Is the disability evidence or testing accommodation policy based on procedures with doubtful validity and reliability? (p. 104)

Under a separate study, Elliott and McKeivitt (2000) state their challenge that the above third question is debatable if Phillips requires a simple “yes” to any of the above when the validity of testing accommodations is to be determined. In the 2000 study, Elliott and McKeivitt concluded that an accommodation of “extended time” was more beneficial to students without disabilities, but was ideally an accommodation that was well-suited for students with disabilities. Thus, Pitoniak and Royer (2001) concur that the
usage of testing accommodations may be questionable, but that Phillips’ five could serve as a basis for research when the validity of test accommodations is to be examined.

Accommodations on standardized assessments allow students with disabilities opportunities to demonstrate their levels of proficiency and knowledge. Individual and educational needs are the basis for the determination of accommodations, especially during standardized assessments. Those needs are determined by a team of educators, advocates, and parents to minimize the effects of a student’s disability and, provide an equitable access to classroom instruction and assessments through specific accommodations.

**Inclusion of Students with Disabilities on Standardized Tests**

Georgia is one of 17 states with emphasis on high-stakes tests such as, state and district-wide assessments, to determine or improve the learning outcome of students, including students with disabilities (Horn, 2003). High-stakes testing has become increasingly common as school districts strive to demonstrate notable measures of academic performance and report school improvement as mandated by NCLB. According to Crawford and Tindal (2006), such decisions for school improvements are “standard-based reforms” designed to increase student achievement through accountability structures at both state and federal levels. Since the enactment of NCLB, a joint alliance with the IDEA 2004 has been formed to ensure the inclusion of students with disabilities in statewide assessment.

Researchers document that prior to IDEA 1997, students with disabilities were excluded and not allowed to participate with nondisabled peers in statewide standardized
assessments and other learning experiences that measure academic strengths and performances. Learning expectations and outcomes were lowered for students with disabilities and, there was limited access to the standards-based general education curriculum (McDonnell, McLaughlin, & Morison, 1997). Koretz and Hamilton (2000) cite that as more students with disabilities are included and participate in general assessments, the need is greater to hold schools accountable for the education of these students. Crawford and Tindal (2006) contend that contributing to state and federal policies regarding full participation and inclusion of students with disabilities in statewide testing is the premise that all children can learn. Thus, as McDonnell et al. (1997) state, there are benefits at the state and district levels that hold educational agencies accountable for teaching and learning practices as students with disabilities are held to high standards and included in the access of the general education curriculum.

The Educational Researcher reported in a 2005 article authored by Sireci that standardized tests that include students with disabilities are typically "flagged" when the administration of the test is conducted under non-standardized conditions or with provisions of testing accommodations. Flagging is a test indicator, generally in the form of an asterisk, that stipulates test accommodations were administered or scores were "obtained under special or unordinary conditions" such as, extended time, oral reading or by utilization of a basic function calculator (Franek, 2006, p. A23). Sireci (2005) further disclosed "flagging" is a conventional alignment with the Standards for Educational and Psychological Testing under the joint efforts of the following three agencies: (a) American Educational Research Association (AERA), (b) American Psychological Association (APA), and the (c) National Council on Measurement in Education (NCME).
Controversies that challenged flagging have since changed the flagging practices of testing agencies [for postsecondary entry opportunities]. For example, the New York Times (April 11, 2000), reports a 29 year-old student without hands was not admitted to post-graduate business school as a result of test flagging due to his disability. The student’s lawsuit asserted it [flagging] is as a scarlet letter that stigmatizes students with disabilities and creates suspicions that test scores of students with disabilities are less valid than the scores of students without disabilities. According to Sireci (2005), in the same article, Standard 10.11 of the Standards for Educational and Psychological Testing states the following:

When there is credible evidence of score comparability across regular and modified administrations, no flag should be attached to a score. When such evidence is lacking, specific information about the nature of the modification should be provided, if permitted by law, to assist test users properly to interpret and act on test scores. (p. 5)

Sireci further interjects that many individuals with disabilities do not want others to know about their disabilities, especially when others are in positions to admit or reject them for something.

Educational reforms across America have positioned states to set higher standards as tools for teaching and learning that include all students, without regard to socioeconomic status, ethnicity or racial identity, English language proficiency, or disability. However, the measure of these standards is not a one-size-fit all solution. In terms of students with disabilities, as in this study, inclusion in statewide assessments for the majority is available through accommodations. While the majority of students that
receive any type of accommodation need the service for success, many students would prefer that their accommodated method of testing under nonstandard conditions remains undisclosed.

Finally, a 2002 National Association of School Psychologists article confirms that the results of standard-based assessment must clearly identify and include data on all groups of students. However,

Educators must exercise caution in interpreting the results of large-scale assessments for all individuals and groups of students, particularly those with disabilities or limited English proficiency, as these tests may not adequately reflect the content or level of their instruction or address realistic instructional goals. (para. 19)

**Dyscalculia and Calculators on High-Stakes Tests**

The review of literature that considers mathematical disabilities or dyscalculia is significant to this study to determine the benefit students with disabilities to use the accommodation of a basic function calculator during a statewide assessment. It has already been noted in this chapter of literary reviews that students with learning disabilities struggle with abilities to listen, speak, read, write, spell, or to do mathematical calculations. However, the literature indicates that researchers, practitioners, and educators report a larger percentage of students who receive services for specific learning disabilities struggle more with mathematical calculations (Bryant, Bryant, & Hammill, 2000). According to Badian (1999), between six and seven percent of all school-aged children have difficulties with mathematical calculations. Garnett (1998) states that
among the number of children classified with learning disabilities, arithmetic difficulties are as pervasive as reading difficulties. Still, not all children identified with learning disabilities have difficulties in both mathematics and reading, which is an observation of the current researcher that is based on classroom experience. Wadlington and Wadlington (2008) recognize the inability to perform well in mathematical computation is due to a mathematical disability identified as dyscalculia. In respect to other researchers, Geary (2000) in a report on mathematical disabilities concluded dyscalculia originates as a genetic or congenital disorder of the brain and, causes a discrepancy between an individual’s general cognitive level and mathematical abilities.

Geary, in his report on dyscalculia, identified three subcategories of the disability: (a) semantic memory—the difficulty to retrieve arithmetic facts that involve the four operations to add, subtract, multiply, and divide; (b) procedural memory—difficulty understanding and applying mathematical procedures relative to rules of integers, exponents, order or operations, solving equations and inequalities, evaluating radical expressions, etc.; and (c) visual-spatial memory—difficulty understanding spatially represented numerical information such as misalignment of columns, place value errors, geometry or concepts relative to proportions of lines, figures, angle representations and the like. Consequently, prior to Geary’s categorization of mathematical disabilities, Garnett (1998) warned that categorized descriptions had not been widely accepted or validated and, thus stated that caution to categorize should be considered until further studies are conducted in respect to math disabilities.

Nevertheless, students with disabilities, particularly mathematical disabilities, are required to participate and demonstrate achievement and growth as federal mandates
stipulate the convenience of annual statewide assessments to rate schools and school 
districts in accordance to the most recent NCLB accountability guidelines for the 
reporting of learning and ongoing progress of all students. Researchers Bridgeman, 
Harvey, and Braswell (1995) stated in their study that calculators are common place in 
schools and society. Their findings revealed that students with or without disabilities, 
across gender, and racial barriers benefited during classroom instruction when the usage 
of calculators was consistent, and thus, scores increased on standardized tests with its usage, too.

Ellington (2003) conducted an integrated 54-study meta-analysis to find the 
impact of calculators upon student achievement and attitudes in regard to mathematics. 
Ellington’s constructs consisted of two categories that were further divided into 
subgroups:

1. skills: (a) operational, (b) computational, and (c) conceptual; and

2. general problem-solving: (a) number of problems attempted with calculator access, and (b) and ability to select best problem-solving strategy with calculator.

In both subcategories, students’ attitudes were considered in conjunction with access to the calculator. Overall, findings revealed that when students were allowed to use calculators during mathematics, there was an improvement in attitudes toward mathematics. Further, the results of Ellington's 2003 study concluded that the usage of calculators among middle-school-aged children should be emphasized when allowed during the instruction of problem solving skills which will serve beneficial during statewide assessments.
Roberts’ (1980) documented review of 34 empirical studies on the impact of handheld electronic calculator usage on student achievement relevant to mathematics found that the primary benefit of the calculator was computational gains rather than conceptual understanding. More than 30 years have passed since Roberts’ study, and educators have expressed skepticism that the usage of electronic calculators or “new technological innovations” (p. 71) allow less creativity and educational gains but, rather rely more on rote memory. However, Allsopp, McHatton, and Farmer (2010) concluded in their study that effective enhancement of technology [such as the calculator] that is integrated into the classroom increases the educational outcomes of students, especially, students at academic risks, and students with learning disabilities. In Roberts’ final analysis, the usage of calculators on criterion tests has more positive than negative benefits which increases educational measures of performances.

A recent study conducted by Engelhard, Fincher, and Domaleski (2011) found that the results of a Georgia statewide test administered with accommodations to elementary (grades 3 and 4) and middle (grades 6 and 7) school students with and without disabilities varied across grade levels and across disabilities. According to the study, a random selection of more than 230 schools across Georgia was used to sample the range of student achievements, demographics, and disabilities. The Engelhard et al. study examined the effectiveness of two types of accommodations: (a) resource guides and, (b) the basic-function calculator. They determined there were both pluses and minuses within the score results for students with disabilities with usage of the basic function calculator as an accommodation. However, the study determined that the usage
of a resource guide, as an accommodation was of zero effect to students with disabilities at either the grade level or disability type.

Summary

The literary investigation of documented studies was accessed through both electronic and manual resources. In discovery, research that pertains to the utilization of the basic calculator accommodation on standardized assessments for students with any type of disability is limited. However, many studies included in the review of the literature for the purpose of this study press accountability guidelines that ensure the performance of students with disabilities is within the margins of their nondisabled peers. Consequently, all of the noted researched studies support the premise that accommodations are widespread tools that increase achievement opportunities for disabled students when their performance is determined by state mandated assessments designed for nondisabled peers.

Additionally, the literary review discloses information about accommodations as they are federally regulated and administered under state guidelines to students with disabilities during standardized assessments required by NCLB. As a result of the review, the characteristics of three groups of students—(a) students with learning disabilities, (b) students with other health impairments, and (c) students with emotional/behavioral disorders—are discussed as their performances on the GCRCT-Math section were examined in conjunction with their nondisabled peers.

Other articles reviewed supported discussions that the inclusion of students with disabilities on standards-based tests measure performance criteria for the general
population of students, and that the significance of the access of a basic calculator is critical since many students with disabilities struggle with dyscalculia. Finally, four of the most highlighted studies within the literary review for this study are in matrix format for a quick glance (see Table 1).
### Table 1

**Highlighted Studies within the Literary Review**

<table>
<thead>
<tr>
<th>Researcher(s)</th>
<th>Participants</th>
<th>(N)</th>
<th>Purpose</th>
<th>Dependent Variable</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bridgeman, Harvey, &amp; Braswell (1995)</td>
<td>High school juniors from diverse group across racial boundaries: African-American, Asian-American, Latino, White</td>
<td>11,457 college bound students</td>
<td>Effects of calculator use on standardized tests (SAT)</td>
<td>Increase of scores with usage of calculator</td>
</tr>
<tr>
<td>Ellington (2003)</td>
<td>Precollege or high school students over a 30-year span of research studies</td>
<td>Analysis of approximately 54 studies from 1983 - 2002</td>
<td>Meta-Analysis to determine the effects of calculators on student achievement and attitudes</td>
<td>Operational and problem-solving skills degree of improvement with calculator as an integral part of classroom instruction and testing</td>
</tr>
<tr>
<td>Roberts (1980)</td>
<td>Honors 8th graders and regular 9th graders</td>
<td>Quinn (1976) 184 participants</td>
<td>Review of 34 empirical studies at three levels: elementary, secondary; What impact does the calculator have on achievement and attitudes</td>
<td>Performance in mathematics; and student attitude when calculator is used as a support</td>
</tr>
<tr>
<td>Englehard, Fincher, &amp; Domaleski (2010)</td>
<td>3rd/4th and 6th/7th graders</td>
<td>947 3rd and 4th graders (students without disabilities; and 459 students with disabilities); 997 6th and 7th graders; 567 students without disabilities; 430 students with disabilities</td>
<td>Determine the outcome of 3rd, 4th, 6th, and 7th graders with and without disabilities on statewide assessment with the accommodations of resource guides and calculators</td>
<td>Student performance on mathematics portion of statewide assessment</td>
</tr>
<tr>
<td>Independent Variable(s)</td>
<td>Design</td>
<td>Results</td>
<td></td>
<td></td>
</tr>
<tr>
<td>-------------------------</td>
<td>--------</td>
<td>---------</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ethnic and gender background; Effects of classroom use of calculator; Test item analysis; Speed of timed sections</td>
<td>Cross-tabulation of Differential Item Functioning (DIF)</td>
<td>Usage of calculator increased test scores modestly; students with more classroom experience with calculator did best</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Effects of calculator use in math classroom; Calculator controversy in math classrooms; Increase levels of technology in classroom</td>
<td>Gilpassian's Techniques of Meta-Analysis; and Hedge's and Olkin's Inferential Statistical Methods</td>
<td>The inclusion of calculators during classroom instruction and testing improved operational skills in grades K-12</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Effects of calculators usage during instruction, and on criterion referenced tests</td>
<td>Pretest / Posttest design with ANOVA procedural guides</td>
<td>More computational than conceptual gains; math performances increased; attitudes more positive in students with access to calculator</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Two test administration accommodations—resource guides and calculators</td>
<td>Repeated measures design (pretest / posttest); and crossed-method design with random assignment of schools to accommodations conditions</td>
<td>Resource guides did not increase performance; calculators yielded larger gains but higher for students without disabilities than for students with disabilities</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
CHAPTER III
THEORETICAL FRAMEWORK

Research Design

This study is designed as a nonexperimental quantitative approach according to Creswell (2009) to collect numerical data to determine whether or not the basic function calculator is a viable intervention for the achievement of students with disabilities on the math CRCT. A nonexperimental approach involves the collection of existing data and other pertinent characteristics of seventh grade students with disabilities identified in this study. The study was conducted at an urban middle school in metropolitan Atlanta.

A survey questionnaire as described by Creswell (2009) was used to collect teacher responses in regard to the relationship between a set of teacher-relevant perspectives and student achievement. The teacher-relevant variables are described and detailed below. Student information was also collected for the purpose of this study that may be relevant to the outcome of student achievement on the math CRCT. Information relevant to students for the purpose of this study was collected through the district’s archived electronic reporting system and compared to the student results of the math CRCT results.

Theory of Variables

Three theoretical framework of thoughts suggested by John Flavell’s (1976) [American] Metacognition Theory, Robert Mills Gagne’s (1965) [American] Conditions
of Learning Theory, and Lev Vygotsky’s (1978) [Russian] Socio-Cultural Theory are the lens of this study. The theories are linked to the social-cognitive-interactive premise of students with disabilities and describe the associated themes of student achievement for the purpose of this study.

In the first theory, Flavell (1976) discusses his learning theory of metacognition and introduces cognitive information processing of thinking about activities in the learning environment. In other words, Flavell identifies three forms of thinking children may engage while in the learning stages: (a) storage of useful information for future sources, (b) active problem-solving information ready for immediate retrieval, and (c) the ability to make cognitive searches for information to solve unexpected problems.

Gagne’s (1965) proposition of learning stipulates a hierarchy of nine levels that require a different type of instruction. Gagne’s theory states children learn in five different categories which include verbal information, intellectual skills, cognitive strategies, motor skills, and attitudes. Gagne’s theory is typical with this study on the achievement of students with disabilities on the CRCT mathematics section. Gagne’s theory and this study share the consensus that students with disabilities are unique individuals with distinct learning characteristics that require a prescribed educational plan for the success of the individual.

The third theory in perspective of this study is Vygotsky’s (1978) social-cultural principle of thought that the role of cognitive development of children is framed through social interaction at two levels. The first level of learning, according to Vygotsky’s theory, occurs through the interpersonal encounters with family, friends, teachers, and
peers; and the second level of learning occurs within the learner herself through practice, reasoning, and application of concepts. Vygotsky’s theme supports this study as students with disabilities engage in activities with nondisabled peers, parents, teachers, and others in the support system to learn in small groups and collaborative settings and, ultimately able to independently utilize pertinent resources to demonstrate student achievement.

The theoretical conception of this study also supports the premise that students with disabilities are eligible to the same educational curriculum, opportunities, and learning goals as students without disabilities. However, access to those opportunities are granted through means of modifications and accommodations which include supplementary aids and support services according to IDEA 2004, Sec. 602 [a][19], 1414[d], and Sec. 602[34][A] (Lee, Wehmeyer, Soukup, & Palmer, 2010). Access to accommodations on the CRCT for students with disabilities in this study is relevant to the success and achievement of the same group of students. Thus, if students with disabilities are to be educated in environments that set learning goals comparable to nondisabled peers, then provisions that allow access to alternative response types are important to ensure fairness and equity.

Researchers Berne and Stiefel documented their 1984 concept of equity in two dimensions – horizontal equity and vertical equity. Theoretically, the Berne and Stiefel concept correlates to this study by its descriptive differentiation of state school funds, resources, and allocations. According to the researchers, horizontal equity suggests the allocation of state school funds and resources is the same across all school districts; and vertical equity refers to the allocation of state school funds and resources to meet the
academic or financial needs of individual students that are less privileged than counterparts to balance educational differences. Although, much of Berne’s and Stiefel’s (1984) discussion about equity is unique for the financial plan and support of student education through the generation and allocation of funds secured by local, state, and federal taxation, their description of equity correlates to this study as a translation that students with disabilities are eligible to receive access to accommodations and systems of support services which level barriers and meet the special educational needs of students who are ability disadvantaged.

In the perspective of Creswell (2009), this researcher identifies the philosophical paradigm for this study as a link to post-positivist assumptions as described in the author’s works. In Creswell’s interpretation, post-positivism represents research of a stated problem that is formulated as a scientific method. The problem operates objectively to describe and determine causes that may influence the outcomes of this study. Such outcomes are generally based on components of experiments, data, and observation in the attempt to describe the reality of knowledge. Hence, this study investigates a collection of data generated by CRCT score results to be compared with and without the usage of the basic function calculator; data from student-relevant information, and data from teacher responses to a survey questionnaire. All data were analyzed to find the relationship to the outcome of student achievement on the math CRCT.
The conceptual model, Figure 1, was developed for this study in consultation with members of the research committee. The dependent variable for this study is student achievement.

The basic function calculator is the primary independent variable for this research. This study is set to investigate the differences in CRCT scores based on the factor of the calculator as an accommodation compared scores without the factor of the calculator accommodation.

Figure 1. Conceptual Model of Theoretical Framework
Additionally, the model of this study harps on two sets of independent variables from math teachers' perspectives and student relevance to investigate the relationships to achievement on the math CRCT for seventh grade students with disabilities. The types of specific disabilities that will affect this study are: learning disabilities, emotional behavioral disturbances, and other health impairments. Students with these types of disabilities are the focus of this study in regard to student achievement. Figure 2 lists the variables relevant to this study.

**Dependent Variable**

**Student Achievement:** The act of demonstrating the criteria of performance standards for successful outcomes ultimately lies within the desires of students coupled with the support of teachers as they provide the necessary instructional tools, information, strategies, and methods. Student achievement is ranked highly within K-12 educational systems as an indicator that students have met academic criteria of proficiency for promotion and graduation. Generally, the criteria are set by teachers, parents, policy makers, state education departments and other factors. According to Glasser’s (1998) *theory of choice*, choice is an individual behavior motivated by internal controls. Thus, in spite their disabilities achievement is attainable when students make the choice and have the desire to perform at the criteria levels to demonstrate academic success. This study is set to look at external factors that may influence student achievement; however, internal factors may be involved but, are not considered at this time.
INDEPENDENT VARIABLES

- Basic Function Calculator
- Students' Gender
- Students' Disability Types
- Students' Mathematics Grade
- Student Attendance
- Students' (Socioeconomic) Status Free & Reduced Lunch
- Teacher Quality
- Staff Development
- Collaborative Planning
- Parental Involvement

DEPENDENT VARIABLE

Student Achievement

Figure 2. List of Variables Relevant to Study

**Independent Variables**

**Basic Function Calculator:** Utilization of the basic function calculator will increase the level of achievement on the CRCT. Accommodations [such as calculators]
help level the playing field for students with disabilities (Fuchs & Fuchs, 1999). The integration of technology in many forms has become a simple strategy used in the classroom by educators during the learning process. The basic function calculator as proposed in this study is a form of technology that many students with disabilities rely upon to demonstrate proficiency of instructional standards for mathematics in classroom settings, and on state and district assessments. As a simple tool, it is a valid conditional accommodation for Georgia’s CRCT participants and, it does not alter change the purpose or intent of the assessment. Students with disabilities often struggle with mathematics and, therefore perform worse on assessments (Fuchs, Fuchs, & Cappizzi, 2005). Thus, the basic function calculator is a viable intervention for students with disabilities on the math CRCT.

**Students’ genders:** Gender differences in terms of student achievement will be examined to determine whether there is a significant difference between the male and female participants identified in this study. Several theories exist to support gender dominance and gaps in mathematics. One such theory is that the spatial skills of boys are more advanced than girls and thus, boys are superior in mathematics when compared to girls (Niederle & Vesterlund, 2010). On the other hand, a university study conducted through data disaggregated from annual assessments across several states for students in grade 2 through grade 11 found that the math scores for males were not significantly different than the scores of females (Park, 2008). However, this study is designed to examine the performance of male and female students with disabilities.
Students' disability types: Three types of disabilities are identified among the students in this study: (a) specific learning disabilities, (b) emotional behavioral disturbances, and (c) other health impairments. This study examines the achievement of students by disability type on the seventh grade math CRCT. Analysis of the achievement of the students under each disability type provides comparative information about student achievement across three disability types on the math CRCT scores. The disability types are identified across students at the seventh grade level for three-year span. The theoretical implication for disability types in concurrence to this study is likely to infer CRCT achievement on the math section will fluctuate between students with the different types of disabilities but, students with access to the calculator will have a greater opportunity to score the minimum requirement of 800 compared to the students without access to the calculator across the three year period identified in this study.

Students' grades: The grades of students for the subject area of mathematics refer to the cumulative end-of-the-year numerical score. The cumulative grade is comprised of teacher-made tests, class and homework assignments, projects, sponges, and notebooks. Numerical scores are based on the district’s grading scale as: 90 – 100 = A; 89 – 80 = B; 79 – 70 = C; and below 70 = F. Thus, for the purpose of this study, the cumulative grade of each student is used as an independent variable. Students' grades are considered confidential information and the identity of participants are not disclosed. However, the students’ cumulative grades are used to compare the relationship between the students’ grades and the achievement of the math CRCT scores. This researcher believes a student’s grades are good indicators or predictors of a student’s performance
on criterion referenced assessments such as the CRCT; since, the curriculum standards for mathematics are aligned to the CRCT. Therefore, students who are able to demonstrate proficiency of classroom-based tasks and assessments are theoretically able to demonstrate the same at annual assessments as the CRCT.

Students' attendance: This study examines the variable of student attendance as it may correlate to student achievement on the GCRCT for students with disabilities. It is believed that the impact of student achievement has a positive influence on the academic performance of students (Johnston, 2000; Lamdin, 1996). Georgia’s compulsory attendance law Subpart 2: Part 1 of Article 16: Chapter 2 of Title 20 of the Official Code of Georgia Annotated Section 20-2-690.1 states the following: Mandatory attendance in a public school, private school, or home school program shall be required for children between their sixth and sixteenth birthdays.

Socioeconomic status of free and reduced lunch: Student achievement and the socioeconomic status of students for the purpose of this study were investigated. This variable was used to determine whether or not there is a relationship between student achievement on the mathematics section of the GCRCT and the socioeconomic status of individual identified in this study. A 2000 study across four states, including Georgia, selected 13,600 urban, suburban, and rural-area schools in approximately 2300 districts found the smaller the population of a school, the lesser the effect of poverty on student achievement (Howley, Strange, & Bickel, 2000). The 2000 study also indicated that the correlation between poverty and low student achievement is much greater at larger populated schools. The correlation between individual participants rather than schools
will be analyzed in this study to determine the relationship between free-and-reduced lunch and student achievement.

**Teacher quality**: Qualifications of teachers have come under close examination of state departments of education, school districts, local school-wide communities, and the federal regulations under NCLB (2001). In conjunction to this study, teacher related variables are theoretically positioned as indicators to determine whether teacher quality will have a direct impact on the achievement of students with disabilities. Although, a lot of emphasis is placed on federally-regulated rubrics and guidelines which are designed to categorize teachers as “highly qualified,” this researcher believes that without the assimilation of effective teacher skills, credentials, experience, and professional teacher behaviors within both the general and special education populations, teacher qualification alone will be the detriment to students and the learning environment. A study conducted by Rice (2003) identified five stems that attributed to the term of teacher qualifications: (a) coursework, (b) preparation, (c) test scores, (d) certification, and (e) experience. Similarly, Rice’s study complements the literary work of Wong and Wong (1998) that characterizes effective teachers in three categories: (a) positive expectations for student success, (b) good classroom management, and (c) design lessons for student mastery. Thus, works by Rice (2003) and Wong and Wong (1998) align with the theoretical framework of this study that teacher quality, traits, and skills have positive impact on the educational outcome of students.

**Collaborative planning**: Collaborative planning between math teachers of students with and without disabilities is another theoretical indicator considered as a
school-wide variable relevant to the outcome of student achievement for this study.

According to an Eric Digest article, the stated philosophy of collaboration is to combine all students with and without disabilities, along with their special and general education teachers in the same classroom (Ripley, 1997). Bauwens, Hourcade, & Friend (1989) further explain that the general philosophy of collaborative planning is to operate in a cooperative teaching environment wherein both general and special educators are responsible for students with and without disabilities. In other words, both general and special education math teachers are present during the delivery of instruction and both share responsibilities for lesson planning, teaching, assessing, and management of student activities in the same classroom setting.

Once weekly, general and special education teachers of mathematics meet within their respective sixth, seventh, and eighth grades across the three middle schools represented in this study to discuss the student achievement and data, student misconceptions and progress, focus of instruction, and instructional goals. Lesson plans for mathematics are developed in regard to the district’s instructional calendar to deliver curriculum standards and objectives, execute teaching strategies, and develop student activities. General and special education math teachers assess student performance based on data generated from standardized, district, and classroom tests. Adjustments, extensions, redelivery strategies and accommodations for students with disabilities are determined to promote student achievement in mathematics. This study explores whether or not collaboration has an impact on the achievement of students with disabilities on the math portion of the GCRCT.
**Staff development:** This researcher identifies staff development as online or face-to-face in-service opportunities for educators to register and attend sessions, workshops, and course-work designed to improve classroom instruction, integrate technology, provide knowledge and skills to perform new roles and duties, and guide pedagogical strategies to facilitate and deliver lessons from performance-based curriculum standards. It is the experience of this researcher that staff development is designed to help build and refine the skills, knowledge and expertise of new and veteran educators in efforts to increase student engagement and improve learning. However, the majority of research on professional development has looked at other variables such as pedagogical changes in practices, knowledge, attitudes, and beliefs to determine the correlation to student achievement (Loucks-Horsley & Matsumoto, 1999). Educational theorists Ball and Cohen (1999) confer staff development would be more practical for educators should the art of teaching and learning how to teach is developed as an ongoing curriculum for staff development.

**Parental involvement:** Parental involvement within the educational environment of local schools is ideally a coveted commodity. This study also examines the impact and the extent of which parents are involved in the communications process with classroom math teachers about the learning goals and activities, decision-making events, and volunteering opportunities that may affect the achievement of their disabled children on the Math-CRCT. Educators are likely to seek parental involvement both at home and school as a means to increase student success. However, often educators unintentionally intimidate parents and interfere with the acts of parental involvement. Staples and
Diliberto (2010) noted the following: "Involving parents in a variety of activities throughout the school year will send a message that school personnel and the parents are members of a real team working together to create a nurturing environment" (p. 59).

Surmising the philosophy of Harré’s and van Langenhove’s (1999), in the deliverance of their “positioning theory,” communications is the key to either the establishment or upset of the role and duty that lies between educators and parents. In another sense, Harré and van Langenhove describe their positioning theory in correlation to the conceptual framework of this study that includes the indicator of parental involvement as a social construct to either engage parents as valuable partners or discourage them as nonexperts in a field that educates both students with and without disabilities. McCloskey (2010) utilized a positioning framework to conduct a case study under the same theory to determine the dynamics of parental involvement into the Individualized Education Plan (IEP) meetings of a child with autism. McCloskey determined that during interactions and IEP meetings, positions taken on were either asserted by the parents, themselves or thrust upon them by members of the IEP team or school practitioners. Thus, in the stance of this researcher, parental involvement must be cultivated to thrive in a school environment which is non-threatening and encouraging that parents are engaged with learning and decision-making activities that the ultimate goal of student achievement is accomplished.
Definition of Variables

The following definitions represent the variables which are identified in this study. Data for each variable were collected using the appropriate instruments described in Chapter IV of this research.

**Basic function calculator:** a hand-held battery or solar-powered educational resource used to add, subtract, multiply and divide or compute mathematical expression; not designed with the capacity to perform representations of linear equations, graphs, and complex algorithms.

**Collaborative planning:** a session with two or more educators working together to plan, develop or create, assign, and deliver specific lessons and learning activities for a specific time-frame for students within the same instructional grade and ability levels or across different grades and ability levels given the same content areas or between interdisciplinary areas.

**Emotional behavioral disturbances:** a display of inappropriate characteristics of an individual with disregard for social and civil rules, another's personal space; signs of aggression, depression, fear, anxiety, changes in moods from happiness to sadness with cause; and often the ability to learn is affected without cause of intellectual capabilities.

**Free-and-reduced lunch:** a federally assisted meal program sponsored by the National School Lunch Program under the U.S. Department of Agriculture to provide assistance to school children within a certain income guidelines with school lunch without out-of-pocket expenses or lunch at a reduced cost.
Gender: classification of students as either male or female.

Learning disability: a cognitive or intellectual condition that either prevents, significantly hinders or interferes with learning basic skills or information that pertains to reading, writing, or mathematics at the same rate as most people of the same age.

Math grade: the final and cumulative grade received by a student at the end of the academic school year or second semester. The grade, measured in numerical quantity, represents teacher-made tests, based performance tasks of classroom and homework assignments, assessments/quizzes, projects, notebooks, and more as determined by the teachers or instructional team.

Other health impairment: the lack of physical strength or mental persistence that interferes with the ability of a student to demonstrate vitality or alertness; includes a heightened alertness to environmental stimuli that result in limited access to the educational and learning environments.

Parental involvement: the engagement of the home, and school community with mutual understanding and encouragement to demonstrate support, active participation, and maintain communications about the child’s progress, needs, deficits, with teachers, administrators through conferences, meetings, volunteer opportunities, field trips, workshops, etcetera.

Teacher quality: a combination of actions and reactions, conduct, beliefs, attitudes and opinions that generate dispositions that are displayed, implied or inferred as negative or positive toward students, peers, colleagues, or parents either in the learning environment or outside the learning environment.
Student achievement: the summation of various educational measures as determined by state departments of education and local school districts of elementary and secondary schools to meet requirements to demonstrate proficiency in of curriculum-based performance standards for subject areas that may include cumulative grades, standardized test scores, school attendance and, other student-related tasks and attributes.

Student attendance: recorded information that documents the physical presence or actual appearance or being of a student in each given scheduled class for a time-frame or period during the daily regular hours of school operation according to the district's calendar of each school day for an academic year of 180 days.

Definition of Relevant Terms

The following definitions represent terms that are used for the purpose of this study. The definitions are used to clarify the contents of this study for contextual meaning.

Adequate Yearly Progress (AYP): an annual measurement of the process to improve student performance and close the achievement gap in mathematics and reading between social, and economical classes of students grouped by poverty, racial and ethnic origins, limited English proficiency, and disabilities in accordance to guidelines set by NCLB of 2001.

Collaborative planning: an educational approach of joint efforts between special and general educators to meet during a common time to share, and discuss strategies, goals, and delivery of instruction for a common subject area. Lesson plans are
developed describe teacher strategies, student activities, and assessments with systems of supports that reach each student-learner and promote student achievement and success.

**Conditional accommodations:** access to tools, technology, and equipment for students with disabilities that extend greater opportunities to demonstrate achievement during standardized test administrations whereas achievement and participation otherwise, would not be inclusive.

**Dyscalculia:** an inability or impairment of a person to make connections with numerical and verbal expressions, and symbols to perform mathematical problems.

**Georgia Criterion Referenced Competency Test (GCRCT or CRCT):** the state's standardized test of students in grades three through eight that assesses students' aptitude, knowledge, and skills of the state's curriculum based on instructional performance standards for mathematics, reading, English language arts, science and social studies.

**Highly qualified teachers:** a provision of the 2001 NCLB law that requires teachers of core content areas (math, reading, science, and etcetera) must have at least a bachelor's degree, and full licensure or state certification to teach a designated core subject, and demonstrate competency and knowledge in subject areas.

**Individualized Education Program (IEP):** a legal document prepared annually by a multidisciplinary team or committee of general and special educators, parents, students, speech pathologists (as needed), psychologists, advocates, and others to define the academic, behavioral, physical, and social performance levels, abilities, and deficits of students with disabilities; identifies learning goals and objectives, and academic
benchmarks; and sets expected learning goals, objectives, and conditions to make progress or master standard-based performance tasks for subject areas that indicate and measure student success and achievement as recommended by the school district.

**Individuals with Disabilities Education Act (IDEA):** federal law that sets standards, recommendations, guidelines, and regulations for the educational privileges, services, and due process procedures for students with disabilities and requires special education.

**Instructional strategies:** methods used by educators during the process of delivering lessons that may include role play, modeling, demonstrations, peer-partnering, journaling, discussions, videos, and offer variety to suit different learning styles.

**Interim grading periods:** scheduled according to the district’s calendar at 4½ or 9½ weeks documented grades (90 – 100 = A; 89 – 80 = B; 79 – 70 = C; Below 70 = F) for each registered class which reports student progress achieved. Parents have the option to pick up or students take home.

**Learning styles:** the visual, auditory or kinesthetic preferred or best choice most suited for an individual to acquire and discover information, gain knowledge, and an understanding of concepts usually associated with the ability the reason, apply logic and, use judgment for an academic performance or task with results of the greatest possible outcome.

**No Child Left Behind (NCLB):** the No Child Left Behind 2001 federal law was enacted under President George W. Bush as a standards-based education reform. The law holds elementary and secondary schools accountable to their states’ standards-based
curriculum that all students, including students with disabilities, will demonstrate measurable growth in the subject of mathematics and reading with a proficient measure of 100% in both subjects by 2014.

**Nonstandardized tests:** tests that are administered with specified allowances for changes and deviations to the design, timing, response, and setting with thoughts for the adaptation of test-takers to remove barriers and get best results.

**Special education:** a federally funded program that allows students with disabilities aged three to 21 to be taught in schools with nondisabled peers or in the least restrictive environment, and to receive a free and appropriate education with modifications (changes in what students are expected to learn) and accommodations (changes in the manner students demonstrate what they have learned).

**Standardized assessments:** tests that are administered, facilitated, and governed under specified guidelines as indicated in the test administration manual without changes or deviations that pertain to the design, directions, instructions, timing, response, and scoring.

**State-regulated accommodations:** state-approved changes for various response types, settings or physical locations, scheduling or timing, and presentation of materials (Braille, large print, etc.) for the administrations of state-required assessments to students with disabilities.

**Students with disabilities:** (also known as children with special needs) children with mental retardation, hearing impairments (including deafness), speech or language impairments, visual impairments (including blindness), serious emotional disturbance,
orthopedic impairments, autism, traumatic brain injury, other health impairments, or specific learning disabilities; and who, by reason thereof, needs special education and related services, according to the Individuals with Disabilities Education Act (IDEA) (P. L. 101-476).

**Students without disabilities or non-disabled peers:** children with typical and appropriate age and grade-leveled physical, cognitive, intellectual, and behavioral development with abilities to think, speak, write, hear, and see.

**Relationship among Variables**

It is proposed that the relationship among the variables in this study represent an interrelated system of predictors with the outcome of student achievement on the math GCRCT for middle school students with disabilities. The relationship among the two sets of variables in this study—the independent and dependent or input and output variables—are compared to determine the influence between each set. Input variables include both teacher-relevant and student-relevant factors which may impact the outcome of this study of student achievement. For each input variable in the framework, the relationship in regard to the output variable is compared to determine the impact on the achievement of students with disabilities on the math CRCT.

It is important to note that it is only since the 2001 federal enactment of No Child Left Behind that the performance of students with disabilities was included in overall results of state standardized tests. However, the law does allow provisions whereas each state department of education identifies specific accommodations for students with disabilities during assessments as the GCRCT to minimize academic strains caused by
intellectual/cognitive, physical, behavioral, environmental or attentive hindrances that may interfere with the performance and success of disabled students.

**Limitations of the Study**

In consideration of the limitations of this investigation, there are three areas to discuss: (a) sample size, (b) location with similar demographics and socioeconomic factors, and (c) access to data beyond the urban middle school. This study is conducted across one urban middle school in the metropolitan Atlanta area. The school has a current total student population of approximately 800 students in grades sixth, seventh, and eighth. Of the total population at the middle school site about 10% to 13% consists of students with disabilities at a given yearly basis. For the purpose of this study, a sample of 92 seventh graders with disabilities across an urban middle school in the Atlanta metropolitan area was examined for the collection of data. The data sample spans for a 3-year period. For the 2009–2010 academic school years, 37 students with disabilities were identified and examined; for the 2010–2011 academic school years, 37 students with disabilities were also identified and examined, and for the 2011–2012 academic school years, 18 students with disabilities were identified and examined for this study. However, of the 92 students with disabilities identified and examined, a sample of 52 students met the stipulations for data collection purposes. Students in the sample of 52 were identified with the following disabilities: (a) specific learning disabilities, (b) emotional behavioral disturbances, and (c) other health impairments. Thus, the available sample size for the collection of data of students with disabilities at the seventh grade
level across a period of 3 years is 52 students at the urban middle school identified for the purpose of this study.

The second limitation is the location of the school in this study. The middle school is situated in an urban school district in the Atlanta metropolitan area. Thus, demographics and socioeconomic factors that may have an effect on the outcome of this study are similar throughout the school. For example the majority of the school’s student population is enrolled in the federally funded free and reduced lunch program which supports low-income students. Future investigations may interest researchers to conduct a study to examine the utilization of the basic function calculator and the achievement of students with disabilities across multiple schools within a district with a diverse demographical and socioeconomic status.

Finally, the initial intent for this study was set to analyze CRCT scores of students with disabilities across three middle schools in an urban metropolitan Atlanta school district. Several attempts were made through administrators at the district’s data control center and through key personnel (principals and data clerks) at two additional middle schools to participate in this study. However, the availability of past years data for the purpose of this study was not productive at the other two middle schools. As a result of the unavailable data, the focus of this study is based on CRCT data at one of the three middle schools. Future studies may suggest a research approach of more than one school as CRCT math scores of students with disabilities are quantitatively analyzed to compare differences across several variables and more than one school. Thus, this study is limited as conducted on a smaller scale but, with the original purpose to compare the
achievement of students with disabilities on the math CRCT with and without access to
the basic function calculator. This study examines data across a period of three years
wherein students with disabilities at the seventh grade level are the focus of this research.

Summary

The theoretical framework of this study is based on the concept that student
achievement on the math CRCT for students with disabilities is attained through the
access of the basic function calculator accommodation, and several other independent
factors. The correlations of the independent variables were determined as the
investigation examined how each impacts the performance of seventh graders with
disabilities across an urban middle school in a metropolitan Atlanta school district.

Research questions are provided to drive the focus of this study. The performance
scores of students with disabilities with and without the usage of the calculator
accommodation on the mathematics section of the CRCT were measured and compared
as a quantitative approach. A survey questionnaire was also utilized to collect
information using a quantitative approach to determine the correlation between each
independent variable and the dependent variable—student achievement.

Theories that support variables relevant to this study are listed and discussed; and,
definitions of terms are provided to clarify and explain the context of the study. Finally,
the limitations of the study are discussed and described above in four parts: (a) sample
size, (b) location with similar student demographics and socioeconomic factors, and (c)
access to data beyond the urban middle school identified in this study.
CHAPTER IV
RESEARCH METHODOLOGY

Research Design

This study was conducted as a quantitative design to collect and compare numerical data of CRCT math scores of students with disabilities for the three academic school years of 2009–2010, 2010–2011, and 2011–2012. Other pertinent student-relevant data were collected at the urban middle school identified in this study. Additionally, teachers of mathematics participated in a questionnaire-survey which pertains to teacher quality, staff development and collaborative planning opportunities, and parental involvement through teacher perspectives. This study also focuses on student relevant data gathered through electronic and manual reports to determine the relationship between several independent variables and student achievement. The quantitative approach was conducted as a nonexperimental study according to Creswell (2009) to compare math CRCT scores of students with disabilities with and without the basic function calculator, and other student-relevant data. The collection and comparative analysis of math CRCT numerical results were conducted under two conditions: (a) students with disabilities with access to the basic function calculator accommodation and, (b) students with disabilities without access to the basic function calculator accommodation on the math CRCT across three academic school years. Collected CRCT data were compared to determine whether or not the primary
independent variable of the basic function calculator is a viable intervention for the outcome of student achievement for students with disabilities on the math CRCT.

A survey questionnaire as described by Creswell (2009) was distributed to collect opinions from math teachers. The survey questionnaire was constructed in consultation with members of the research committee and modeled as Likert’s (1932) five-point scale. Numerical data collected from the responses of math teachers only were used in connection with student CRCT scores to determine the relationship between math teachers’ quality and math teachers’ opinions about professional practices that may impact student achievement. Variables that pertain to the teacher survey questionnaire are described and detailed in Chapter III. Relevant student information for the purpose of this study was collected as numerical data and linked to student CRCT score results. The student information was used to determine the relationship to the outcome of student achievement on the math CRCT. Information relevant to students for the purpose of this study was collected and accessed through the district’s electronic reporting system and compared to the student results of the math CRCT results. Student relevant variables are described and detailed in Chapter III. This study involves seventh grade students with disabilities across an urban middle school in an Atlanta metropolitan school district.

Participants of this study include certified and highly qualified general and special educators with current district-obligated contracts to teach the content core course of mathematics to students with disabilities or to middle school students at grades 6, 7, and 8. Participants also include seventh grade students with documented IEPs across three academic school years at the middle school identified in this study.
The first order of design for this study is to compare the CRCT math scores of two groups of seventh grade students with disabilities. In the first group, students had access to the basic function calculator accommodation on the math CRCT and, in the second group students were without access to the basic function calculator accommodation on the math CRCT. Student participants in this study have documented IEPs that specifically indicate whether the usage of the basic function calculator is allowed during the assessment of the mathematics portion of CRCT. The math scores of the two participating groups with and without access to the basic function calculator were compared to determine whether or not the basic function calculator is a viable intervention for student achievement on the math GCRCT.

Secondly, the design of this study used student-relevant information drawn from the district's electronic and manual reporting systems to reveal whether student data, for the purpose of this study, have a relationship to student achievement. Student-relevant information was collected using numerical indicators for the quantitative approach of this study. The information collected on the seventh grade students with disabilities in this study include: (a) students' specific disabilities, (b) gender, (c) daily school attendance, (d) math grades that result from teacher made tests and classroom performance, and (e) the socioeconomic status of students in terms of free and reduced lunch. Numerical indicators that represent collected data for each independent variable are discussed under Coding Procedures of this chapter.

Thirdly, this study was designed to gather numerical data generated from a survey-questionnaire (Creswell 2009) of teacher perspectives. The survey was designed
for math teachers only to collect opinions to determine whether or not there is a relationship between math teacher quality and their perspectives about professional practices that may impact student achievement. In this survey design, general and special education math teachers of students with disabilities were asked to provide numerical indicators that state their perspectives of the following professional practices variables: (a) teacher quality, (b) collaborative planning, (c) staff development, and (d) parental involvement.

For the purpose of this study, the name of the urban middle school involved in this research was withheld. Student and teacher participants in this study will also remain anonymous. The disabilities of students will be categorized as: (a) students with learning disabilities, (b) students with emotional and behavioral disturbances, and (c) students with other health impairments. Specific disabilities of each student are categorized during the analysis of data. The approach of this study was to use a comparative design to look at the performances of seventh grade students with disabilities on the mathematics portion of the CRCT with and without the utilization of the basic function calculator. The comparison determines whether or not the basic function calculator is a viable intervention for student achievement on the math CRCT. This study was also designed to use a survey-questionnaire, according to Creswell (2009), to determine whether or not there is a relationship between a set of independent variables that consist of teacher professional practices and, student information and, the dependent variable of student achievement.
This study was designed to conduct a comparison of the performances of students with disabilities on the math CRCT under five conditions:

1. with and without access or usage of the basic function calculator accommodation \textit{without} regard to the students’ disabilities;

2. with and without the basic function calculator accommodation across three types of students’ disabilities: (a) learning disabilities, (b) emotional behavioral disorders, and c) other health impairments;

3. across a period of three years at the urban middle school represented in this study;

4. the relationship between student-relevant information and student achievement based on student independent factors listed in this study; and

5. the relationship between teacher quality and teacher-relevant variables listed in this study.

In the first analysis, students were categorized into two groups in order to compare their performances: (a) students who have access to the basic function calculator through the documentation of an IEP as an testing accommodation during the administration of the math CRCT, and (b) students who do not use the calculator as an accommodation during the administration of the math CRCT. It is important to indicate that students with access and usage of the basic function calculator on standardized tests such as the CRCT have to meet two conditions under Georgia’s provisions of federally-regulated accommodations as indicated in Chapter I and, the specific accommodation
must be written in the student's IEP in order to receive access during the math CRCT or any standardized assessment.

Secondly, this study investigates and compares the differences in the performances of students with and without usage of the basic function calculator accommodation across three types of disabilities on the math CRCT. Students who have been identified and receive special education services for: (a) learning disabilities, (b) emotional behavioral disturbances, and (c) other health impairments will be categorized as calculator users and non-calculator users on the CRCT. The group of students with calculator access was compared to the group of students without the calculator access according to their categorized disabilities. The design of the comparison is set to determine whether or not access to the calculator accommodation coupled with disability types have an impact on student achievement in regard to the math CRCT.

Thirdly, the CRCT scores of seventh grade students with disabilities across three academic school years (2009-2010, 2010-2011, and 2011-2012) were collected and compared in numerical form. Students were categorized in the groups of: (a) with access, and (b) without access to the basic functions calculator accommodation. It is important to note that instruction in mathematics at the urban middle school is aligned to the Georgia Performance Standards (GPS). Students with and without disabilities are required to meet the same performance standards in mathematics as indicated in the district's curriculum guide. However, students with disabilities receive accommodations according to their academic needs during instruction and standardized tests as written or documented in their IEP. This investigation is designed to determine whether or not
there is a significant difference between student achievement on the math CRCT and the usage or access with and without the basic function calculator accommodation for students across three disabilities and, across three academic school years at the middle school identified in this study.

Next, this study is designed to collect teacher perspectives through a survey-questionnaire completed by mathematics teachers of seventh grade students with and without disabilities at the urban middle school. The survey was designed to collect numerical data to measure math teachers’ perspectives of teacher quality, staff development, collaborative planning, and parental involvement based on Likert’s (1932) frequency five-point-scaled model. The collected data were used to determine whether there is a relationship between teacher quality and professional practices as viewed by math teachers that may impact student achievement on the mathematics section of the CRCT.

Finally, this study was designed to collect student-relevant data with a quantitative approach to determine whether or not there is a relationship to student achievement on the math CRCT. Information was gathered from the district’s electronic reporting system in regard to the following student variables: (a) daily attendance, (b) gender, (c) math grades based on teacher tests and classroom performance, and (c) socioeconomic status of free and reduced lunch. Numerical data of student information were compared to the students’ CRCT scores to determine whether or not there is a relationship between the student independent variables and the achievement of seventh grade students with disabilities on the math CRCT.
Description of the Setting

This study was conducted across a public middle school setting in a metropolitan Atlanta district. The district of the urban middle school in this study has an enrollment of more than 93,000 students. In the district, there are 62 elementary schools (grades K – 5); 21 middle schools (grades 6 – 8); 20 high schools (grades 9 – 12); nine charter schools, and five alternative schools. The district’s student population is composed of approximately 42% African-Americans or blacks; 34% Caucasians or whites; 12% Hispanics; 9% Asians; 3% Multiracial groups; and less than 1% Native Americans. More than 12,000 employees have full-time status and about 7,000 employees hold certifications as classroom teachers or administrators (Fulton County Schools, 2011a). The district had a proposed budget for the 2011-2012 fiscal year just under a billion dollars at about $900 million (Fulton County Schools, 2011b).

The research site for the middle school named in this study will remain anonymous. The school is located in a community south of downtown Atlanta. Total enrollment of students in grades 6 through 8 across the 3-year span of this study has fluctuated between 800 to 900 students with nearly 89% of the student population on free and reduced lunch. The enrollment of students with disabilities at the identified school is about 10% to 13% per year of the total population inclusive of grade levels 6, 7, and 8. Forty three certified members of the faculty at the urban middle school teach at least one core subject (reading, mathematics, English/language arts, science, and social studies) to students in the general and exceptional (special) education departments. Other members of the staff at the urban school include the principal, assistant principals, certified elective
teachers, one counselor, one graduation coach, one math coach, one shared reading and English language arts, several paraprofessionals, and office support personnel.

Demographics of the student population profile of the urban middle school for the academic years 2001-2011 are included in Appendix A. The information provided in Table I is sourced by the Georgia School Council Institute [GSCI] (GSCI, 2011). Data on the overall performance in mathematics, reading, and English language arts for students with disabilities in grade 7 were available at the time of this research for the urban school during the 2010-2011, 2009-2010, and 2008-2009 academic years, and are illustrated in Appendix B. The charts indicate the percentage of students with disabilities within the CRCT performance categories of the expectations of score criteria at the middle school as: Does not Meet – CRCT score is below 800; Meets – CRCT score is from 800 to 849; and Exceeds – score is from 850 to 950.

**Sampling Procedures**

The urban middle school in the metropolitan Atlanta school district identified in this study has a current student population of approximately 800 students with and without disabilities in grades 6, 7, and 8. This study focuses on male and female students in grade 7 with learning disabilities, emotional behavioral disturbances, and other health impairments. Currently, approximately 290 students make up the enrollment of seventh grade students at the middle school in this study. As of the 2011–2012 academic years, students with disabilities made up more than 10% of the total population across grades 6, 7, and 8.
Students identified with disabilities in this study are separated by their specific disability types categorized as learning disabilities, emotional behavioral disturbances, and other health impairments. Each group consists of male and female students. Further, each student participant received educational services in mathematics with accommodations according to the IEP. In the instance of this study, accommodations in the IEP specified that students either had access or did not have access to the basic function calculator for the mathematics section of the CRCT. The sample of participants is categorized into two groups: (a) students with disabilities with access to the basic function calculator, and (b) students with disabilities without access to the basic function calculator on the math CRCT.

Accommodations are provided to students in accordance to specific needs of students as indicated in their current IEP. It is imperative to note that the administration of accommodations for qualifying students during state standardized assessments is in compliance with IDEA of 2004 and regulated by state boards of education that govern the assessments. According to the GAM, accommodations are designed to reduce the effects of the disabilities of students, and to provide access to the general curriculum when state laws require participation of students with disabilities in the general curriculum for classroom instruction and statewide assessments. Additionally, any student with access of the basic function calculator on statewide assessments must meet specified conditions (GaDOE, 2008).

GCRCT math scores of seventh graders with disabilities from the spring semesters of 2010, 2011, and 2012 were the focus of the investigation of this study. The
math CRCT results and data in regard to student-relevant variables were collected through the district's electronic and manual reporting systems. Student information will remain anonymous throughout the focus of this study. Information was used to separate the seventh graders with disabilities into two groups: (a) with calculator accommodation; and (b) without calculator accommodation on the CRCT for each academic school year identified in this study. Furthermore, the data were used to make distinction between students identified with the following categories of disabilities: (a) specific learning disabilities, (b) emotional behavioral disturbances, and (c) other health impairments. All the information gathered will be analyzed as a quantitative approach with the Statistical Package for the Social Sciences (SPSS) software program.

**Working with Human Subjects**

The intent of this study was to maintain the confidentiality of all human participants, the name of the middle school, and the specific district involved in this study. There were no known risks associated with the research process to gather information either from or about participants. The researcher did not anticipate any unforeseen physical and bodily harm or the endangerment to any person or subject anonymously identified in this study. Confidentiality and anonymity are protected throughout for the purpose of this study by the usage of pseudonyms.

**Instrumentation**

The collection of CRCT math performance data obtained for the purpose of this study were retrieved from the district's electronic and manual reporting systems across three academic years of 2009–2010, 2010–2011, and 2011–2012. Student-related
information was also collected through the district’s electronic and manual systems. The CRCT scores and student-related information were recorded on a data sheet devised by this researcher to include the variables: (a) CRCT scores, (b) accommodation of with or without the basic function calculator, (c) student disability type, (d) student gender, (e) student attendance based on a 180-day school year, (f) student final math grade at end of the respective school year, and (g) student socioeconomic status of free and reduced lunch.

Additionally, a survey-questionnaire developed in consultation with members of the research committee was used to gather data in respect to teacher perspectives of the following variables: (a) teacher quality, (b) staff development, (c) collaborative planning, and (d) parental involvement to determine the relationship to student achievement. This instrument to collect teacher perspectives is based on the Likert (1932) five-point frequency-scaled model. Math teachers responded to closed-ended statements that range from one to five where one is “Never” and five is “Very Frequently.” All collected student and teacher-relevant data were transferred into and analyzed through the SPSS software program.

Results of the statewide CRCT assessment are conducted and distributed by the GaDOE in three categories: (a) “Does not meet” standards – numerical scores below 800, (b) “Meets” standards – numerical scores from 800 to 849, and (c) “Exceeds” standards – numerical scores from 850 to 950. Students with scores that are less than 800 do not meet the expectations of the learning criteria and did not demonstrate proficient knowledge required to perform standards for a specific content course area. However,
scores between 800 and 849 are indicators that students met required performance standards and demonstrated proficient knowledge of subject area requirements; and finally, scores that range from 850 to 950 indicate students exceeded the expected criteria and demonstrated performance of standards beyond the level of proficiency.

The teacher-related survey-questionnaire and data collection instruments follow the listed references for this study as appendices.

**Participants/Location of Research**

**Teachers:** All 11 male and female general and special education teachers are contracted by the district as full-time mathematics teachers at the urban middle school identified in this study. Each mathematics teacher at the middle school was contacted via electronic mail and asked to participate in the survey-questionnaire constructed for this study under the consultation of members of the research committee. The survey-questionnaire was based on Likert’s (1932) five-point frequency scale and distributed to each math teacher participant. The questionnaire was designed to collect numerical data of the perspectives of math teachers about teacher quality, collaborative planning of educators, professional staff development, and parental involvement. The information collected from the responses of the survey-questionnaire of each math teacher is in correlation to teacher quality and teacher-relevant variables that may impact student achievement for students with disabilities on the math CRCT.

**Students:** Participants of this study include 52 male and female seventh grade students with disabilities across an urban middle school in a metropolitan Atlanta school district. Student participants are aged from 13 to 15 years old. Student participants are
both either active or inactive enrollees of the middle school identified in this study given a specific academic school year. The student participants are eligible to receive services for special education according to IDEA of 2004, and the Georgia Department of Education Division for Special Education Services and Supports Manual (2011). All student participants receive educational services, supports, and accommodation according to their written IEP in compliance to IDEA of 2004. Students are categorized as individuals with learning disabilities, emotional and behavioral disturbances, and other health impairments. All students are eligible to participate in the state-mandated CRCT as required for students without disabilities. Test accommodations for each student are written in the IEP for students. For the purpose of this study, students were identified according to their disability and IEP accommodation as: (a) access to the basic function calculator or (b) without access to the basic function calculator on the math CRCT. Data collected on the student participants were used to investigate whether or not the calculator is a viable intervention on student achievement on the math CRCT. Numerical data in regard to all student factors include: CRCT scores, gender, disability type, final math grades as described above, number of days absent in a 180 day-school year, and socioeconomic status of free and reduced lunch.

**Location:** The research process is conducted at an urban middle school in an Atlanta metropolitan area school district in the state of Georgia.

**Data Collection Procedures**

The process for collecting data for this study was advanced through a series of contacts with the appropriate personnel at the district’s headquarters, and the research site
identified in this study. Contact was necessary to gain access to specific data relevant to
the purpose of this study. An application, along with a proposal to conduct this research
study was sent to the district’s headquarters to request permission for the collection of
data for the purpose of this study. The data collection instruments along with the
informed consent form were also sent to headquarters of the district. A letter of approval
was forwarded by the district to this researcher to proceed with the study. Following the
letter of approval, permission was sought from the principal of the identified middle
school to conduct the teacher-survey to collect data for the perspectives of math teachers
in regard to the independent variables, and to retrieve pertinent student CRCT data and
information. Approval was granted by the principal and the collection of data was
pursued.

Results of the math CRCT scores of seventh graders with disabilities were
obtained from the registrar’s office through manual retrieval for assessment years 2010,
2011, and 2012. Following the collection of CRCT scores, the district’s electronic
reporting systems were accessed to determine and record student disability, access to the
basic function calculator, gender, final numerical grade in mathematics for each
respective year, number of absent days, and socioeconomic status of free and reduced
lunch. Documentation of access to accommodations is stated in a student’s IEP for
standardized testing. This information of accommodation and disability type was verified
through the district’s electronic reporting system that maintains students with special
needs.
Each mathematics teacher of both the general and special education departments at the urban middle school was invited to participate in the teacher perspectives survey through electronic mail messaging. The survey-questionnaire was later distributed in a manila envelope to each teacher of mathematics with the informed consent form attached. The informed consent form described the study, the principal investigator, background information, the purpose of the study, procedures for math teachers, survey time allotment, compensation, discomforts or risks, benefits of being in the study, confidentiality, voluntary nature of the study, and contact information for the researcher, and university advisors. Each teacher participant was asked to sign the informed consent form as agreement to participate in the study. Following a two-day completion period for the survey-questionnaire, the consent form and survey-questionnaire were collected from each teacher by the researcher.

Collected data on variables that pertain to student and teacher participants were organized by this researcher by each identifiable year. Once all data were collected, sorted, categorized, and recorded onto the instruments for this research, a spreadsheet in the SPSS program was set up to input data information for analysis. The data input into the SPSS program were intended to answer the research questions presented in Chapter I of this study.

**Coding Procedures**

Participating students and math teachers were identified in numerical order by the academic year of the CRCT assessment. For example, a seventh grader of the academic school year 2009–2010 was identified in the SPSS spreadsheet as student number 1001,
in succession of 1002, 1003, and further on. In order to correlate the data collected from the teacher survey with data collected from the student-related variables, each teacher was coded as ST for special educator or GT for general educator. The responses of each teacher was then corresponded or matched with their respective students by academic year or years using a similar number code. For example, a special or general educator or teacher at the urban middle school during the academic year of 2009–2010 was identified as ST1001 or GT1001. A teacher with more than one academic years of experience teaching mathematics was identified with each identifiable academic year. For example, a special or general educator or teacher at the urban middle school during the academic years of 2010–2011 and 2011–2012 was identified as ST111201 or GT111201. This procedure was used to identify and match all teacher participants of this study. Student-relevant data were coded as follows:

**Math CRCT Scores:** Actual numerical scores were used to indicate student achievement: Below 800 (Student *Does Not Meet* Georgia performance criteria); 800 to 849 (Student *Meets* Georgia performance criteria); 850 and above (Student *Exceeds* Georgia performance criteria).

**Accommodations:** 1 = with access to basic function calculator; 2 = without access to basic function calculator.

**Attendance:** Based an 180 academic year: 1 = 0 – 5; 2 = 6 – 10; 3 = 11 – 15; 4 = 16 – 20; 5 = > 20 days a student is absent at school

**Gender:** 1 = male; 2 = female
Math Grades: Actual numerical grades based on district’s grade scheme for curriculum-based assessments, teacher-made tests, class work and homework assignments, projects, and classroom activities.

Disability: 1 = Learning Disabilities; 2 = Emotional Behavioral Disturbances; 3 = Other Health Impairments

Socioeconomic Status – (Free & Reduced Lunch): 1 = Yes; 2 = No

Teacher-relevant data were coded as follows:

Teacher Quality (TQ): 1 = Yes; 2 = No. Seven closed-ended items require a response. Items were coded as TQ1, TQ2, TQ3, TQ4, TQ5, TQ6, and TQ7. Rating for this variable ranged from 7 to 14, where the total of 7 is the least numerical score and the total of 14 is the greatest numerical score for this variable.

Collaborative Planning (CP): Based on a five-point Likert (1932) frequency scale. Six closed ended items require a response. Items were coded as CP1, CP2, CP3, CP4, CP5, and CP6. Rating for this variable ranged from 6 to 30, where the total of 6 is the least numerical score and the total of 30 is the greatest numerical score for this variable.

Staff Development (SD): Based on a five-point Likert (1932) frequency scale. Seven closed ended items required a response. Items were coded as SD1, SD2, SD3, SD4, SD5, SD6, and SD7. Rating for this variable ranged from 7 to 35, where the total of 7 is the least numerical score and the total of 35 is the greatest numerical score for this variable.
**Parental Involvement (PI):** Based on a five-point Likert (1932) frequency scale. Five closed ended items required a response. Items were coded as PI1, PI2, PI3, PI4, and PI5. Rating for this variable ranged from 5 to 25, where the total of 5 is the least numerical score and the total of 25 is the greatest numerical score for this variable.

**Statistical Applications (Quantitative)**

Data analysis procedures were employed through SPSS to determine the relationship between CRCT scores of students with disabilities with and without the basic function calculator and student achievement, the disabilities of students and student achievement, student final grades and student achievement, variables as listed in Chapter III of this study, and student achievement of seventh graders with disabilities on the math CRCT.

Due to the nature of this study in its quantitative format, four types of analyses were conducted for this study. All analyses generated through SPSS and are identified as: (a) Independent Samples t-tests, (b) Pearson Correlations, (c) one-way ANOVA and, (d) cross tabulations. CRCT math performances of two groups of students with disabilities, with and without the basic function calculator, were compared using the Independent Samples t-test in SPSS as the best assumption to determine the central tendencies of the groups and whether the means of two groups have a significant difference of .05 or less. Additionally, the relationship between two continuous variables, as described by Muijs (2008) for correlation coefficient or Pearson’s $r$ was used to measure whether the CRCT scores of students with or without the basic function calculator have forbearance on the disabilities, gender, socioeconomic status, final math
grades or number of days absent in a 180-day school year. Each set of data are displayed according to its intended purpose using the appropriate instrument.

Summary

The methods of research design and procedures for collection and analysis of data are discussed as pertinent for this study. A thorough description is given of the urban middle school site with information that includes student population, teacher and administrator distribution, locale of school setting, and indicators of the school’s socioeconomic status.

Procedures to collect population samples as participants are described as well as consideration for the protection of student and school anonymities. Instruments to collect data for this study are the results of the GCRCT mathematics section for selected student participants, and a survey-questionnaire for teachers of mathematics for the 2009–2010, 2010–2011, and 2011–2012 academic school years.

Permission to conduct the study was attained through the district’s commands to submit to the district’s assessment and accountability department a research application, a proposal, and the data collection instruments. Permission to conduct the study at the specific research site was granted by the chief administrator of the urban school after the researcher presented the district’s approval letter, and the informed consent form for the study.

The collection of data process began with the survey-questionnaire distributed to each general and special education mathematics teacher at the urban middle school. The intent was to collect numerical data relevant to teacher perspectives about professional
practices that may impact student achievement. All data were analyzed through a variety of
descriptive analyses using SPSS which consists of the following: (a) Independent Samples t-test, (b) one-way analysis of the variance, (c) Pearson Correlations, and (d) cross tabulations.
CHAPTER V

ANALYSIS OF THE DATA

This study was based on a quantitative design to determine whether or not the basic function calculator is a viable intervention for seventh grade students with disabilities on the mathematics section of the CRCT across a 3-year span. This study was also set to analyze whether certain identified student and teacher-relevant variables had a significant impact on student achievement for the sample of students identified in this study. SPSS was utilized to analyze data in regard to the research questions for this study. The analyses were conducted through the following SPSS descriptives: (a) Independent Samples t-tests, (b) one-way ANOVA, (c) Pearson Correlations, and (d) cross tabulations.

Table 2 is a statistical representation of math CRCT mean scores of students with disabilities sampled in this study from spring semesters 2010, 2011, and 2012. The analysis indicates the number of students with and without access to the basic function calculator on the mathematics CRCT across the 3-year-period. The mean of the scores was 798 – approximately 2 points below the passing score of 800. The results concluded that the mean difference of math CRCT scores ranged from .03 to 2.39. Thus, students with disabilities sampled in this study were within 2 points of passing the math CRCT with or without access to the calculator. The standard deviation for the set of data across the three-year period ranged from 15.351 to 18.739.
Table 2

*Math CRCT Mean Scores of Students with Disabilities, Spring Semesters 2010, 2011, and 2012*

<table>
<thead>
<tr>
<th></th>
<th>N</th>
<th>Mean</th>
<th>Std. Deviation</th>
<th>Std. Error Mean</th>
</tr>
</thead>
<tbody>
<tr>
<td>CRCT 2010</td>
<td>16</td>
<td>798.69</td>
<td>18.739</td>
<td>4.685</td>
</tr>
<tr>
<td>CRCT 2011</td>
<td>18</td>
<td>798.72</td>
<td>17.361</td>
<td>4.092</td>
</tr>
<tr>
<td>CRCT 2012</td>
<td>18</td>
<td>796.33</td>
<td>15.351</td>
<td>3.618</td>
</tr>
</tbody>
</table>

In Table 3, the sample of 52 individual student’s math CRCT scores collected for this study are indicated as with or without access to the basic function calculator. Given the 52 math CRCT scores in the tables below, 29 students with disabilities had access to the basic function calculator, and 23 students with disabilities did not have access to the basic function calculator. The maximum math CRCT score for the sample of students with disabilities at the seventh grade level in this study was 825 and, the minimum math CRCT score was 749.

Given the sample of students for this study, 29 seventh graders with disabilities had an IEP that provided the accommodation of access to the basic function calculator on the math CRCT. A “meets expectations” score of 800 and above was received by 18 of the 29 students with the IEP accommodation of the calculator. Consequently, 23 students with disabilities in the sample did not have the accommodation of access to the basic function calculator, according to their IEP.
Table 3

_math CRCT Scores With and Without Basic Function Calculator_

<table>
<thead>
<tr>
<th>CRCT Scores</th>
<th>With Calculator</th>
<th>Without Calculator</th>
<th>Total</th>
<th>CRCT Scores</th>
<th>With Calculator</th>
<th>Without Calculator</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>749</td>
<td>1</td>
<td>0</td>
<td>1</td>
<td>800</td>
<td>3</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td>767</td>
<td>2</td>
<td>0</td>
<td>2</td>
<td>801</td>
<td>0</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>773</td>
<td>1</td>
<td>0</td>
<td>1</td>
<td>802</td>
<td>3</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td>775</td>
<td>0</td>
<td>2</td>
<td>2</td>
<td>803</td>
<td>0</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>778</td>
<td>1</td>
<td>0</td>
<td>1</td>
<td>804</td>
<td>2</td>
<td>0</td>
<td>2</td>
</tr>
<tr>
<td>779</td>
<td>1</td>
<td>0</td>
<td>1</td>
<td>805</td>
<td>1</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>780</td>
<td>0</td>
<td>1</td>
<td>1</td>
<td>806</td>
<td>1</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>781</td>
<td>1</td>
<td>0</td>
<td>1</td>
<td>807</td>
<td>0</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>783</td>
<td>0</td>
<td>1</td>
<td>1</td>
<td>809</td>
<td>1</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>784</td>
<td>0</td>
<td>1</td>
<td>1</td>
<td>811</td>
<td>0</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>785</td>
<td>0</td>
<td>1</td>
<td>1</td>
<td>812</td>
<td>0</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>789</td>
<td>2</td>
<td>0</td>
<td>2</td>
<td>813</td>
<td>1</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>790</td>
<td>0</td>
<td>1</td>
<td>1</td>
<td>814</td>
<td>1</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>791</td>
<td>0</td>
<td>1</td>
<td>1</td>
<td>817</td>
<td>0</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>792</td>
<td>2</td>
<td>0</td>
<td>2</td>
<td>818</td>
<td>2</td>
<td>0</td>
<td>2</td>
</tr>
<tr>
<td>794</td>
<td>0</td>
<td>1</td>
<td>1</td>
<td>819</td>
<td>1</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>795</td>
<td>0</td>
<td>1</td>
<td>1</td>
<td>821</td>
<td>1</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>796</td>
<td>0</td>
<td>1</td>
<td>1</td>
<td>822</td>
<td>1</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>798</td>
<td>0</td>
<td>1</td>
<td>1</td>
<td>825</td>
<td>0</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>29</strong></td>
<td><strong>23</strong></td>
<td><strong>52</strong></td>
<td><strong>Total</strong></td>
<td><strong>29</strong></td>
<td><strong>23</strong></td>
<td><strong>52</strong></td>
</tr>
</tbody>
</table>
Eleven of the 23 students without calculator access received a score that "meets expectations" of 800 and above on the math CRCT without access to the basic function calculator. Overall, 18 out of 29 or 62% of the students with disabilities passed the math CRCT with access to the basic function calculator; and 11 out of 23 or about 48% of the students with disabilities passed the math CRCT without access to the basic function calculator. Taken as a whole, 29 students out of 52 with disabilities sampled in this study or approximately 56% were successful on the math CRCT either with or without access to the basic function calculator as documented in each IEP. Math CRCT scores that are at 800 and above indicate students have demonstrated proficiency in mathematics in accordance to grade level curriculum standards.

Seventh grade students with disabilities sampled in this study with math CRCT scores below 800 were identified as 11 out of the 29 or 38% of the students with access to the basic function calculator; and 12 out of 23 or 52% of the students without access to the calculator sampled in this study also, scored below 800. Thus, 23 of the 52 students or approximately 44% of seventh grade students with disabilities sampled in this study either with or without the basic function calculator did not score at least 800 on the math CRCT to demonstrate proficiency.

Data Analysis in Response to Research Questions

Following are the SPSS results for each research question presented in this study. The research questions were analyzed in the order given in Chapter I of this study.
RQ1: Is there a significant difference in the performance of students with disabilities on the math CRCT between those with access to the basic function calculator and those without access?

In Table 4, a sample description of the number of seventh grade students with disabilities with and without access to the basic function calculator on the math CRCT is given. The table indicates that 29 students with disabilities with access to the basic function calculator had a mean math CRCT score of approximately 797; and that 23 students with disabilities without access to the basic function calculator had a mean math CRCT score of approximately 799. Mean difference for the two groups is 1.84, and the standard deviations are estimated at 18 and 15, respectively.

Table 4

<table>
<thead>
<tr>
<th>Calculator YN</th>
<th>N</th>
<th>Mean</th>
<th>Std. Deviation</th>
<th>Std. Error Mean</th>
</tr>
</thead>
<tbody>
<tr>
<td>CRCT Scores</td>
<td>1.00</td>
<td>29</td>
<td>797.07</td>
<td>18.322</td>
</tr>
<tr>
<td></td>
<td>2.00</td>
<td>23</td>
<td>799.91</td>
<td>15.105</td>
</tr>
</tbody>
</table>

The independent samples test is an analysis of the two sample groups in this study to determine whether there was a significant difference between the performance of the students with and without access to the basic function calculator on the math CRCT. Based on the significant value of ≤ .05 or 5% and results of the independent samples test, (t = -.389, sig. = .699), there was no statistical significant difference in the performance
of students with disabilities on the math CRCT between the group with access to the basic function calculator and the group without access (see Table 5).

Table 5

*Independent Samples Test: CRCT Scores With and Without Basic Function Calculator on the Math CRCT*

<table>
<thead>
<tr>
<th>CRCT Scores variances assumed</th>
<th>Levene's Test for Equality of Variances</th>
<th>t-test for Equality of Means</th>
<th>95% Confidence Interval of the Difference</th>
</tr>
</thead>
<tbody>
<tr>
<td>Equal</td>
<td>F: 0.739, Sig: 0.394</td>
<td>t: -0.389, df: 50, Sig (2-tailed): 0.699</td>
<td>Mean: -1.844, Std. Error: 4.742</td>
</tr>
<tr>
<td>Equal</td>
<td>F: 0.398, df: 49.906, Sig: 0.693</td>
<td>t: -0.389, df: 49.906, Sig (2-tailed): 0.693</td>
<td>Mean: -1.844, Std. Error: 4.636</td>
</tr>
</tbody>
</table>

RQ2: Is there a significant difference between the performance of seventh grade students with disabilities on the math CRCT with and without access to the basic function calculator across a three-year period for the 2009–2010, 2010–2011, and 2011–2012 school years?

The following analysis was based on statistical data found in Table 2 to determine whether or not the math CRCT scores across a 3-year span, as stated in research question 2, were significantly different. The mean of the math CRCT scores across the 3-year period is 797.88 as indicated in Table 6.
Table 6

Math CRCT Scores of Seventh Graders across a 3-Year Span

<table>
<thead>
<tr>
<th>Test Value = 797.88</th>
</tr>
</thead>
<tbody>
<tr>
<td>95% Confidence Interval of the Difference</td>
</tr>
<tr>
<td>t</td>
</tr>
<tr>
<td>CRCT 2010</td>
</tr>
<tr>
<td>CRCT 2011</td>
</tr>
<tr>
<td>CRCT 2012</td>
</tr>
</tbody>
</table>

The significant value remains ≤ .05 or 5%. According to the results of the one-sample t test, there was no significant difference in math CRCT scores between students with disabilities with or without the calculator across the three-year span of the given school years of 2009–2010 ($t = .172$; sig. = .865); 2010 – 2011 ($t = .206$; sig. = .839); and 2011 – 2012 ($t = -.427$; sig. = .674).


In the next analysis, statistical tables were used to answer research question 3. In Table 7, students with learning disabilities were sorted into two groups: (a) with access to the basic function calculator and (b) without access to the basic function calculator. As indicated in the table, there are 41 students with learning disabilities.
Table 7

*Seventh Grade Students with Learning Disabilities on the Math CRCT across the 2009-2010, 2010-2011, and 2011-2012 School Years*

<table>
<thead>
<tr>
<th>Calculator YN</th>
<th>N</th>
<th>Mean</th>
<th>Std. Deviation</th>
<th>Std. Error Mean</th>
</tr>
</thead>
<tbody>
<tr>
<td>CRCT SCORES</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1.00</td>
<td>21</td>
<td>800.10</td>
<td>13.967</td>
<td>3.048</td>
</tr>
<tr>
<td>2.00</td>
<td>20</td>
<td>796.45</td>
<td>13.628</td>
<td>3.047</td>
</tr>
</tbody>
</table>

Twenty one of the students with learning disabilities had access to the basic function calculator, and 20 students with the same disability did not have access to the calculator on the math CRCT as shown in Table 7. The mean math CRCT score for the students with access was about 800, and for the students without access, the mean score was about 796.

Further analysis was indicated in Statistical Table 8. An independent samples test was done to determine whether there is a significant difference between the performances of the students identified in this study with learning disabilities, as one group had access and the other group did not have access to the basic function calculator on the math CRCT. Based on the significant value of ≤ .05 or 5% and results of the independent samples test (t = .845, sig. = .403), there was no statistical significance between the performance of students with learning disabilities sampled in this study with and without access to the basic function calculator.
Table 8

Independent Samples Test: Students with Learning Disabilities with and without Access to the Basic Function Calculator

<table>
<thead>
<tr>
<th></th>
<th>Levene's Test</th>
<th>95% Confidence Interval of the Difference</th>
<th>t-test for Equality of Means</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>for Equality of Variances</td>
<td>Std. Error</td>
<td>Mean</td>
</tr>
<tr>
<td>CRCT Equal</td>
<td>.057</td>
<td>.813</td>
<td>.845</td>
</tr>
<tr>
<td>Scores variances assumed</td>
<td>.846</td>
<td>38.975</td>
<td>.403</td>
</tr>
</tbody>
</table>

RQ4: Is there a significant difference between the performances of seventh graders with emotional behavioral disturbances on the math CRCT with and without access to the basic function calculator across the 2009–2010, 2010–2011, and 2011–2012 school years?

Based on the sample, only two students were identified with the disability of emotional behavioral disturbances. One of the students is female. Without access to the basic function calculator, the student scored 825 on the math CRCT. The other student in the study sample with the disability of emotional behavioral disturbance is male. The male student scored 806, and had access to the basic function calculator. The sample of two students is too statistically small for a complete analysis.
RQ5: Is there a significant difference between the performances of seventh graders with other health impairments on the math CRCT with and without access to the basic function calculator across the 2009–2010, 2010–2011, and 2011–2012 school years?

The analyses in the following statistical tables test the significant difference between the performances of students as stated in the above question. In Table 9, a total of nine students in the sample were identified with other health impairments. Seven of these students had access to the basic function calculator on the math CRCT, and two students did not have access to the basic function calculator. The mean math CRCT scores were approximately 787 for students with other health impairments with access to the basic function calculator, and approximately 811 for students with the same disability without access to the basic function calculator.

Table 10 is an independent samples test used to determine whether or not there was a significant difference in the performance of students with other health impairments as identified in this sample with and without access to the basic function calculator on the math CRCT. Based on the significance value of ≤ .05 or 5% and results of the independent samples test indicated in Statistical Table 9 (t = -1.122, sig. = .299), there was no statistical significance between the performance of students with other health impairments sampled in this study with and without access to the basic function calculator on the math CRCT.
Table 9

*Students with Other Health Impairments with and without Access to the Basic Function Calculator on the Math CRCT*

<table>
<thead>
<tr>
<th>Calculator Y/N</th>
<th>N</th>
<th>Mean</th>
<th>Std. Deviation</th>
<th>Std. Error Mean</th>
</tr>
</thead>
<tbody>
<tr>
<td>CRCT SCORES</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1.00</td>
<td>7</td>
<td>786.71</td>
<td>27.311</td>
<td>10.323</td>
</tr>
<tr>
<td>2.00</td>
<td>2</td>
<td>810.50</td>
<td>20.506</td>
<td>14.500</td>
</tr>
</tbody>
</table>

Table 10

*Independent Samples Test: Students with Other Health Impairments with and without Access to the Basic Function Calculator on the math CRCT*

<table>
<thead>
<tr>
<th>CRCT Equal Scores variances assumed</th>
<th>Levene’s Test for Equality of Variances</th>
<th>95% Confidence Interval of the Difference of Means</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>F</td>
<td>Sig.</td>
</tr>
<tr>
<td>CRCT Equal</td>
<td>.906</td>
<td>.373</td>
</tr>
<tr>
<td>not assumed</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Equal variances not assumed</td>
<td>-1.336</td>
<td>2.177</td>
</tr>
</tbody>
</table>
RQ6: Is there a significant relationship between student attendance and student achievement on the math CRCT for seventh grade students with disabilities?

The one-way analysis of variance (ANOVA) was used to determine whether student achievement on the math CRCT had a significant relationship to the number of days students were absent from school among 0 – 5 days (n = 37), 6 – 10 days (n = 5), and 11 – 15 days (n = 5). The analysis is given in p-value and shows no significant relationships between the variances of student attendance and CRCT scores (F-test value (sum of squares) = .178, significant p-value ≤ .05 or 5%; p-value = .842. In Table 11, a greater number of students was absent within the zero to five days category. Within that group of students with zero to five days of absences, the minimum math CRCT score and the maximum math CRCT score was identified respectively as 749 and 825. The math CRCT scores at the minimum of 778 and 779 were very close among students who were absent six to 10 days, and 11 – 15 days. The one-way ANOVA compares the means for two or more groups to determine whether the groups are significantly different in terms of a particular factor as in this study—math CRCT scores or student achievement. ANOVA describes the variances between and within the groups. The sum of squares describes the difference between the groups (336.59) of student attendance, and the sum of squares for the difference within the groups (4734.83) of student attendance.
Table 11

**ANOVA: CRCT Scores by Student Attendance**

<table>
<thead>
<tr>
<th></th>
<th>Sum of Squares</th>
<th>df</th>
<th>Mean Square</th>
<th>F</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Between Groups</td>
<td>338.042</td>
<td>2</td>
<td>169.021</td>
<td>.178</td>
<td>.842</td>
</tr>
<tr>
<td>Within Groups</td>
<td>4734.833</td>
<td>5</td>
<td>946.967</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>5072.875</td>
<td>7</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

A Post-hoc Scheffe' test was not necessary for the ANOVA since there was no need to determine the degree of variances. P-value indicated there was no significant relationship between student attendance and student achievement on the math CRCT with or without access to the calculator for students with disabilities.

RQ7: Is there a significant relationship between the final classroom numeric grade in mathematics and student achievement on the math CRCT for seventh grade students with disabilities?

A correlations test in SPSS was used to analyze the relationship between the two variables identified in this study: (a) student’s final classroom numeric mathematics grade and (b) student achievement on the math CRCT for seventh grade students with disabilities. Pearson’s $r$ was used in the analysis to determine the correlation between the two variables. The value for significance for correlations analyses is determined by $p$ at $\leq .01$. There were 52 pairs of math CRCT scores and final numeric math grades, whereby the math CRCT score for each student was paired with the match for the individual final numeric math grade reported at the end of an academic school year.
According to Table 12, a Pearson's correlation factor $r$ was approximately 1 at .560 (.560 was flagged with the indicator (**), which represented significance between the final numeric math grade and math CRCT scores. The $p$ value was given at .000 which was less than the significant value of .01 as indicated for the correlations test. Thus, according to Table 12, there was a relationship between the final numeric math grade and student achievement on the math CRCT.

Table 12

*Correlations: CRCT Scores and Final Math Grades*

<table>
<thead>
<tr>
<th>CRCT Scores</th>
<th>Final Math Grades</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pearson Correlation</td>
<td>1</td>
</tr>
<tr>
<td>Sig. (2-tailed)</td>
<td></td>
</tr>
<tr>
<td>N</td>
<td>52</td>
</tr>
<tr>
<td>Final Math Grades</td>
<td>Pearson Correlation</td>
</tr>
<tr>
<td>Sig. (2-tailed)</td>
<td></td>
</tr>
<tr>
<td>N</td>
<td>52</td>
</tr>
</tbody>
</table>

**. Correlation is significant at the 0.01 level (2-tailed).

RQ8: Is there a significant difference between the performances of male and female seventh grade students with disabilities on the math CRCT?

The analyses in the following statistical tables test the significant difference between the performance of male and female students with disabilities on the math CRCT as stated in research question 8.
In Table 13 (Group Statistics), a descriptive analysis of the population is given as the number of male (37) and female (15) seventh grade students with disabilities sampled in this study.

Table 13

*Performance of Male and Female Students with Disabilities on the Math CRCT*

<table>
<thead>
<tr>
<th>Gender</th>
<th>N</th>
<th>Mean</th>
<th>Std. Deviation</th>
<th>Std. Error Mean</th>
</tr>
</thead>
<tbody>
<tr>
<td>CRCT</td>
<td>Male</td>
<td>37</td>
<td>798.24</td>
<td>18.288</td>
</tr>
<tr>
<td></td>
<td>Female</td>
<td>15</td>
<td>797.00</td>
<td>13.109</td>
</tr>
</tbody>
</table>

The mean math CRCT score for each group was given as the male sample indicated a mean of 798, and the female sample had a mean score of 797. A mean difference of about 1.0 was found for math CRCT scores for male and female students with disabilities in this study, according to the analysis. Further analysis was done as the independent samples t-test (Table 14). The independent samples t-test provided information that statistically compared the means of two independent groups as males and females. The degree of significance was determined by the significant value of ≤ .05 or 5% and, significance was based on the value of the t factor. In regard to whether or not there was a significant difference between the performance of male and female seventh grade students with disabilities on the math CRCT, the analysis indicated that (t = .239, sig. = .812). Therefore, according to the independent t-test, equal variances assumed, there was no significant difference between the math CRCT scores of male and female seventh grade students with disabilities sampled in this study.
Table 14

*Independent Samples Test: Performance by Gender of Students with Disabilities on the Math CRCT*

<table>
<thead>
<tr>
<th></th>
<th>t-test for Equality of Means</th>
<th>95% Confidence Interval of the Difference</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Levene's Test for Equality of Variances</td>
<td>Sig. (2-tailed)</td>
</tr>
<tr>
<td>CRCT Scores</td>
<td>Equal variances assumed</td>
<td>F</td>
</tr>
<tr>
<td></td>
<td>Equal variances not assumed</td>
<td>.275</td>
</tr>
</tbody>
</table>

RQ9: Is there a significant relationship between the socioeconomic status of free and reduced lunch and student achievement of seventh grade students with disabilities on the math CRCT?

The analysis for research question 9 was conducted through the correlations test in SPSS. Correlations are used to provide information about the relationship of two variables. In this study, the relationship between the socioeconomic status (free and reduced lunch) and the achievement of students based on math CRCT scores were tested. The number of cases sampled for math CRCT scores is 52, and the number of cases within the 52 with the socioeconomic status of free and reduced lunch is 47.
Statistical Table 15 describes the relationship between the two variables through the significance factor for $p \leq .01$. The significance between the variables stated in the research question above was indicated by Pearson's correlation factor $r = .237$, $p = .105$. Based on the analysis below, there was no significant relationship between the socioeconomic status of students with disabilities and their math CRCT scores.

Table 15

*Correlations: CRCT Scores and Student Socioeconomic Status (SES)*

<table>
<thead>
<tr>
<th></th>
<th>CRCT SCORES</th>
<th>Free Reduced Lunch</th>
</tr>
</thead>
<tbody>
<tr>
<td>CRCT SCORES</td>
<td>Pearson Correlation</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>Sig. (2-tailed)</td>
<td>.105</td>
</tr>
<tr>
<td></td>
<td>N</td>
<td>52</td>
</tr>
<tr>
<td>Free Reduced Lunch</td>
<td>Pearson Correlation</td>
<td>.237</td>
</tr>
<tr>
<td></td>
<td>Sig. (2-tailed)</td>
<td>.105</td>
</tr>
<tr>
<td></td>
<td>N</td>
<td>47</td>
</tr>
</tbody>
</table>

** Correlation is significant at the 0.01 level (2-tailed).

The set of analyses that follows below is relevant to statistical information generated through a survey-questionnaire design (Creswell 2009) of teacher perspectives, and analyzed through SPSS. The teacher survey-questionnaire was used to collect teacher quality information and the perspectives of general and special educators to test statistical relationships between teacher quality and teacher-relevant perspectives. Below are the results of the teacher survey questionnaires.
RQ10: What is the quality of certified mathematics teachers sampled at the urban middle school for this study?

Data collected from the teacher survey resulted in a total of 11 mathematics teachers across sixth, seventh, and eighth grades. There were three mathematics teachers at each grade level—two general and one special education teachers, and two remedial mathematics teachers for students at either grade level. The sample of mathematics teachers surveyed was asked to indicate their level of education: (a) bachelor's level, (b) master's level, and (c) beyond master's level. Based on information obtained from the survey, 3 of 11 teachers hold a Bachelor's degree; 4 of 11 teachers hold a Master's degree, and 4 of 11 teachers hold degrees that are beyond the Master's level. No further analysis was conducted for this portion of the study.

RQ11: What is the relationship between teacher qualifications and teacher collaborative planning sessions according to the perspectives of teachers at the urban middle school?

Math teachers surveyed were asked their views on the practices and relevance of collaborative opportunities to prepare students for the math CRCT. At the urban middle school, collaborative opportunities engage both general and special education mathematics teachers in the sessions. A total of six questions were asked. The math teachers answered the questions on a scale of 1 to 5 when 1 is never, 2 is rarely, 3 is occasionally, 4 is frequently, and 5 is very frequently. Answers to the questions on collaborative opportunities range from six to 30.
According to the analysis in Statistical Table 16, cross tabulations indicate mathematics teachers with bachelor's degrees at the urban middle school rate collaboration from 22 to 26 out of 30 points. Math teachers with master's degree levels rate collaboration at a scale from 14 to 25 out of 30 points; and math teachers with qualifications and degrees beyond the master's degree level perceive collaborative opportunities at a range from 26 to 29; with one teacher beyond the master's degree level with a rating of 22 out of 30 points.

Table 16

Cross Tabulation: Collaboration by Teacher Qualifications

<table>
<thead>
<tr>
<th>Collaboration</th>
<th>Count</th>
</tr>
</thead>
<tbody>
<tr>
<td>14.00</td>
<td>0</td>
</tr>
<tr>
<td>21.00</td>
<td>1</td>
</tr>
<tr>
<td>22.00</td>
<td>1</td>
</tr>
<tr>
<td>24.00</td>
<td>1</td>
</tr>
<tr>
<td>25.00</td>
<td>0</td>
</tr>
<tr>
<td>26.00</td>
<td>0</td>
</tr>
<tr>
<td>27.00</td>
<td>0</td>
</tr>
<tr>
<td>29.00</td>
<td>0</td>
</tr>
<tr>
<td>Total</td>
<td>3</td>
</tr>
</tbody>
</table>

Based on the findings, the analysis may indicate that the math teachers at the bachelor's degree level and, at the beyond master's degree level may have more regard for the practices of collaborative planning sessions. The analysis may also indicate that of the two groups, math teachers with bachelor's degrees may have less experience and knowledge about collaborative planning sessions than the math teachers at the beyond master's degree. Thus, math teachers at the beyond master's level may operate in roles of school leadership with duties to facilitate the collaborative planning sessions. On the
other hand, math teachers at the master’s degree level indicate lower ratings. Although their qualifications are between the bachelor’s and beyond master’s degree levels, their ratings may indicate a lack of involvement in leadership roles and result in ultimate feelings of ineffectiveness.

RQ12: What is the relationship between teacher qualifications and staff development experiences according to the perspectives of math teachers at the urban middle school?

Mathematics teachers provided their perspectives on the design and purpose of staff development workshops. A total of 7 questions were asked of the math teachers. Feedback from the math teachers were based on a scale from 1 to 5 when 1 is never, 2 is rarely, 3 is occasionally, 4 is frequently, and 5 is very frequently. Answers to the questions on staff development range from seven to 35. The analysis was conducted through cross tabulations.

According to Table 17, math teachers at all three levels—Bachelor’s degree, Master’s degree, and beyond Master’s degree—returned ratings that ranged from 18 to 23 out of the possibility of 35 in the area of staff development design and purpose. Further research is necessary to determine the reasons behind low ratings of staff development workshop design and purpose at the urban middle school identified in this study.

RQ13: What is the relationship between teacher qualifications and parental involvement according to the perspectives of math teachers at the urban middle school?
Table 17

Cross Tabulation: Staff Development by Teacher Qualifications

<table>
<thead>
<tr>
<th>Teacher Qualifications</th>
<th>Count</th>
<th>Staff Development</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bachelor's Degree</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>Master's Degree</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Beyond Master's Degree</td>
<td>0</td>
<td>2</td>
</tr>
<tr>
<td>Total</td>
<td>1</td>
<td>4</td>
</tr>
</tbody>
</table>

Perspectives of math teachers at the bachelor's degree, master's degree, and beyond master's degree levels were taken about parental involvement and participation from the survey questionnaire. Five questions were asked of the math teachers surveyed for this study. Teacher responses were based on a scale from 1 to 5 when 1 is never, 2 is rarely, 3 is occasionally, 4 is frequently, and 5 is very frequently. Answers to the questions on parental involvement range from five to 25.

According to Statistical Table 18, cross tabulations indicate low ratings were the results of the survey. According to the analysis, math teachers at the three levels of degree qualifications perceived parental involvement and participation at a range from 8 to 11 out of the possibility of 25 points. Recommendations for active parental involvement and participation will require further research pertinent to the dynamics of the urban middle school identified in this study.
### Table 18

*Cross Tabulation: Parental Involvement by Teacher Qualifications*

<table>
<thead>
<tr>
<th>Count</th>
<th>Parental Involvement</th>
<th></th>
<th></th>
<th></th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>8.00</td>
<td>9.00</td>
<td>10.00</td>
<td>11.00</td>
</tr>
<tr>
<td>Bachelor's Degree</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td>Master's Degree</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>4</td>
</tr>
<tr>
<td>Beyond Master's Degree</td>
<td>0</td>
<td>2</td>
<td>1</td>
<td>1</td>
<td>4</td>
</tr>
<tr>
<td>Total</td>
<td>2</td>
<td>4</td>
<td>3</td>
<td>2</td>
<td>11</td>
</tr>
</tbody>
</table>
CHAPTER VI

FINDINGS, CONCLUSIONS, IMPLICATIONS, AND RECOMMENDATIONS

Problem in Context

Students with disabilities are required by the federal law, No Child Left Behind (NCLB), to participate in annual state-mandated assessments. However, student achievement on the annual math CRCT for public school students with disabilities in an Atlanta, metropolitan school district was identified as a problem. Students with learning disabilities, emotional behavioral disturbances, and other health impairments or illnesses that include attention deficit hyperactive disorders, diabetes, sickle cell anemia, cancer, and more, often struggle with educational challenges that interfere with their ability to demonstrate performance criterion standards as their non-disabled peers on required assessments in math, reading and other core subjects. Consequently, the basic function calculator is one of many math CRCT accommodations or supports that are set aside by the Georgia Department of Education (GaDOE) for students with disabilities. However, in order to have access to the accommodation of the basic function calculator on the math CRCT, students with disabilities must meet two conditions as stated in the 2008 edition of the GAM.

This study was designed to establish that access to the basic function calculator for students with disabilities is a viable intervention for student achievement on the Georgia math CRCT and to provide data that substantiates the findings. A resolution to
the problem presented in this study would imply that the unconditional access to the basic function calculator would increase student achievement on the math CRCT for a greater percentage of students with disabilities.

**Review of Related Literature**

A review of related literature disclosed studies that pertained to the performance of students with disabilities on state standardized assessments. Discussions of the literature included the academic challenges that impact the success of students with disabilities during the educational process and upon the achievement of school-aged children to read, write, speak, and perform mathematical computations (Knoblauch & Sorenson, 1998). The literary reviews are inclusive of discussions on the following: (a) specific learning disability; (b) other health impairment (Oswalt, 2010); (c) emotional behavioral disturbances (George, Vannest, Willson, & Davis, 2009); (d) federally regulated accommodations (NCLD, 2006; GaDOE, 2008); (e) inclusion of students with disabilities on standardized tests (Horn, 2003); (f) dyscalculia and students with disabilities (Wadlington & Wadlington, 2008; Bryant, Bryant, & Hammill, 2000); (g) reforms that impact learning expectations for students with disabilities (McDonnell, McLaughlin, & Morison, 1997; Koretz, & Hamilton, 2003; Crawford & Tindal, 2006); and (h) the pros and cons of the usage of calculators for academic achievement (Roberts, 1980; Allsopp, McHatton, & Farmer, 2010).

The literary review included four empirical studies that suggested the outcome of student achievement was influenced by the variables that included basic function calculator during instruction and criterion referenced tests (Roberts, 1980); ethnic and
gender background information (Bridgeman, Harvey, & Braswell, 1995), usage of classroom technology, and attitude, (Ellington, 2003), resource guides and calculators, (Englehard, Fincher & Domaleski 2010).

The literatures under review for this study encourage accountability guidelines for departments of education that ensure the performances of students with disabilities are endured by accommodations that allow measurable margins within the ranges of their non-disabled peers. In other words, the noted researched studies support the premise that accommodations are widespread systems of support that increase achievement for disabled students on state mandated assessments designed for non-disabled peers.

**Theoretical Framework**

Three theories were used to support the paradigm of this study that students with disabilities have educational needs which require remedies that foster productive environmental settings, options to respond to forms of assessments, and services that allow the attainment of achievement measures comparable to those of non-disabled peers. The examination of Flavell’s (1976) theory of metacognition, Gagne’s (1965) theory on the conditions of learning, and Vygotsky’s (1978) theory on the social-cultural settings of children provided the basis to build the framework for this study.

In Flavell’s (1976) learning theory, metacognition is a system children use to process thinking about activities in the learning environment in three forms: (a) storage, (b) active problem-solving, and (c) cognitive searches for information to solve unexpected problems. Based on empirical knowledge, students with disabilities often require prompts, cues, and other types of resources to promote active engagements during
the learning process. Flavell’s theory was used in this study to describe metacognition as an untreated process that occurs without outside stimuli.

Gagne’s (1965) theory states children learn in five different categories: (a) verbal information, (b) intellectual skills, (c) cognitive strategies, (d) motor skills, and (e) attitudes. Gagne’s theory shares consensus with this study that students with disabilities are unique individuals with various distinct learning characteristics. It is important to note that Gagne’s theory supports this study with the reasoning that learning milestones are achieved on an individualized basis for students with disabilities. Ideally, achievement for students with disabilities should be based on the outcome of personalized cognitive assessments rather; the performance standards identified by state departments of education for general student populations.

Finally, Vygotsky’s (1978) theory is modeled upon the social-cultural principle of thought that cognitive development of children is framed through social interaction at two levels: (a) social interaction with teachers, family, friends, peers, etc., and (b) within the learner herself through practice, reasoning, and application of concepts. The Vygotsky theory fits the framework of this study as students with disabilities are known to thrive in supportive environments where success is achieved through demonstrations, preparation, and exercise of skills at the performance level of the learner. Students sampled in this study experienced the Vygotsky theory and their success was based on their ability to apply the mathematical they had learned with or without access to the calculator.
Research Methods

The design of this study involved a quantitative approach to analyze student and teacher-relevant data through SPSS 17.0 and identify critical relationships between the primary dependent variable of student achievement as a minimum score of 800 on the math CRCT and several independent variables. Descriptives for the analyses included: (a) independent samples t-test, (b) one-way analysis of variance, (c) Pearson correlations, and (d) cross tabulations. The set of student-relevant data was used to determine whether or not access to the basic function calculator had a significant impact on the achievement of students with: (a) learning disabilities, (b) other health impairments, and (c) emotional behavioral disturbances on the math CRCT. Other variables relevant to student achievement with and with the access to the calculator on the math CRCT included: (a) gender of students, (b) daily school attendance in a 180-day school year, (c) final numeric math grade based on classroom assignments and teacher-made tests, and (d) socioeconomic status of free and reduced lunch. Data in regard to teacher-relevant variables were cross-tabulated in SPSS to determine the relationship between teacher qualifications and teacher perspectives of professional practices that may influence student achievement at the urban middle school in this study. Teacher-relevant variables included: (a) collaborative planning sessions, (b) staff development workshops, and (c) parental involvement.

Student and teacher information remained anonymous throughout the data collection events. Student data were retrieved through the district’s electronic and manual reporting systems across three academic years in regard to dependent and
independent variables. Teacher perspectives were collected through a survey-questionnaire Likert (1932) model.

**Statistical Findings**

In SPSS, a significance at $\leq .05$ was used for the independent samples t-test and one way analysis of variance; and at $\leq .01$ for Pearson correlations. A statistically significant relationship between final classroom numeric math grade and achievement on the math CRCT was found according to the SPSS analysis. A descriptive analysis of the finding is revealed in Chapter V - Statistical Table 12. According to the analysis, a relationship between the independent and dependent variables was found with Pearson’s $r$ at .56 and the significant value at .000; correlation is significant at $\leq .01$. Based on the outcome of the significant relationship between the final numeric math grade and student achievement on the math CRCT, the main explanation suggests teacher collaboration, instructions, assignments, tests, and classroom activities were aligned to performance standards for the math CRCT. Thus, the relationship found between the final classroom numeric grade in mathematics and the achievement of students on the math CRCT indicates classroom instruction mirrored CRCT standards that students demonstrated an achievement score of 800 or greater on the math CRCT.

However, significant differences were not found between the scores of students with and without access to the basic function calculator on the math CRCT across a three-year span as sampled in this study (see Chapter V - Statistical Table 5). The findings also revealed that the mean of the scores for the two groups across the three year period was approximately a two-point difference (see Chapter V - Statistical Table
2). Similarly, the mean of the math CRCT scores for each academic year (2009–2010, 2010–2011, and 2011–2012) sampled in this study was indicated in Chapter V and a mean difference between the years that ranged from .03 to 2.39 - Statistical Table 2. There was no significant difference in the performance of students with disabilities on the math CRCT scores across the three year-period with or without the access of the calculator as sampled in this study and indicated in Chapter V - Statistical Table 7. The collection of the 52 math CRCT scores for the purpose of this study is listed in Chapter V - Statistical Table 3.

The outcome of the 52 students was that 29 students had access to the basic function calculator during the math CRCT. Eighteen of the 29 students or 62% with access to the calculator achieved a CRCT score of 800 or above. Twenty-three of the 52 students in this sample did not have access to the basic function calculator. However, 11 of the 23 students or 48% achieved a score of 800 or above on the math CRCT without access. The findings of this study indicate that the success rate for students with access to the calculator was 14% more than the success rate for students without calculator access on the math CRCT. Thus, 18 students with access and 11 students without access for a total 29 students out of the 52 or approximately 56% of seventh grade students with disabilities sampled in this study were successful on the math CRCT across the 3-year span.

In another sense, there were 41 students with learning disabilities in the sample of 52 students. As a result, 23 students out of 41 or 56% of the students with learning disabilities achieved a score of 800 or above. Further analysis of the data in Chapter V -
Statistical Tables 7 and 8 from the independent samples test indicated 21 students with learning disabilities had access, and 20 students with learning disabilities did not have access to the calculator on the math CRCT. However, following further analysis of the data, it was found that 14 of the 21 students or 66% of the students with learning disabilities were successful on the math CRCT with access to the calculator; and nine of the 20 students or 45% of the students with learning disabilities were successful on the math CRCT without access to the basic function calculator. Overall, according to the analysis in the independent samples test, there was not a significant difference between the math CRCT scores of students with learning disabilities as one group had access and the other group did not have access to the calculator.

Statistical analysis of the data shown in Chapter V - Tables 9 and 10 identified nine students with other health impairments. Four students out of the nine or 44% of the students with other health impairments achieved a score of 800 or above. The statistics indicated that seven of the nine students with other health impairments had access to the basic function calculator and two did not have access to the calculator on the math CRCT. Further analysis of the data found that three students with other health impairments out of seven or about 43% had access to the calculator and were successful on the math CRCT; and only one out of the remaining two students with other health impairments was successful on the math CRCT without access to the calculator. Based on the findings from the independent samples test, there was no significant difference between the math CRCT scores of students with other health impairments with or without access to the basic function calculator.
The number of students with emotional behavioral disturbances was too small to obtain an analysis in SPSS. However, there were two students identified with emotional behavioral disturbances in the sample of 52 students. Both of the students were successful on the math CRCT—one with access and the other without access to the basic function calculator.

Statistical analyses in SPSS also were conducted to determine whether a significant relationship was found between the following student-relevant independent variables that included daily attendance, final numeric math grade, gender, the socioeconomic status of free and reduced lunch, and the dependent variable of student achievement on the math CRCT. The analysis for student attendance was conducted in one-way ANOVA and it was found that there was not a significant relationship between student attendance and student achievement on the math CRCT with or without access to the calculator for students with disabilities. Similar results of no significance were found in the analyses of the relationships between the independent variables of gender, and the socioeconomic status of free and reduced lunch of students with disabilities, and the dependent variable of student achievement (see Chapter V - Statistical Tables 13, 14, and 15).

The findings for the collection of perspectives from both special and general education teachers of mathematics through a survey-questionnaire were analyzed in SPSS with cross tabulations tests. In the initial section of the questionnaire, mathematics teachers were asked to disclose information about licensure, years of experience as a teacher of mathematics, and height of educational levels. Based on the survey, 27% of
the math teachers had less than 10 years of service with a bachelor’s degree level, 36% of 
the math teachers at the urban middle school had a master’s degree, and 36% had a 
degree beyond the Master’s level of education with both groups at more than 10 years of 
service as math teachers.

Statistical analyses of teacher perspectives in regard to the independent variables 
of collaborative planning, staff development, and parental involvement were tabulated in 
SPSS (see Statistical Tables 16, 17, and 18). Data collected from the mathematics 
teachers about collaborative planning practices that may impact student achievement had 
a score ranged from six to 30 on Likert’s model. The analysis conducted in SPSS cross 
tabulations (Statistical Table 16) found that mathematics teachers with degrees beyond the 
Master’s level perceived collaborative planning practices at the highest approval rating 
with a composite score from 26 to 29 out of 30 or an approved rating from 86 to 96%. 
Following, math teachers at the Bachelor’s level viewed collaborative planning with an 
approved composite score that ranged from 22 to 26 out of 30; and math teachers at the 
Master’s degree level approved the practices of collaborative planning with a composite 
score of 14 to 22 out of 30.

Data in regard to the relationship between teacher qualifications and teacher 
perspectives of staff development opportunities that may impact student achievement 
were collected on the same Likert modeled survey-questionnaire, and analyzed in SPSS 
cross tabulations (see Statistical Table 17). Perspectives of math teachers were gathered 
in seven fields in regard to staff development. In the findings, the data revealed that math 
teachers at the Bachelor’s, Master’s, and beyond Master’s degree levels had similar
perspectives with scores ranged from 18 to 23 out of the possible 35 points or an approved rating from 51 to 65%. All teachers of mathematics surveyed believed there were fewer staff development opportunities that allowed training during regular work hours (from 8 a.m. to 4 p.m.), and fewer opportunities that allowed interaction with math teachers throughout the district to gain cross-cultural views on learning applications, and strategies.

The final set of data analyzed in this study pertained to the relationship between teacher qualifications and teacher perspectives of the involvement of parents for student achievement and progress. Responses in regard to teacher perspectives of parental involvement had a value that ranged from five to 25. According to the analysis conducted in SPSS cross tabulations, (see Statistical Table 18) from the Likert modeled survey questionnaire, math teachers at all levels of degree qualifications returned perspectives about parental involvement that ranged scores from 8 to 11 out of 25 possible points or from 32 to 44% approved rating. Results of the analysis also indicated that math teachers perceived parental communications and participation the least form of involvement.

Specific Findings

In the matter of significant relationships, final numeric math grade had a statistically significant relationship to the performance on the math CRCT. The explanation for this finding suggested student achievement resulted upon the collaborative efforts of general and special education math teachers to plan and deliver standards-based lessons in mathematics that correlated to CRCT standards, and that
students identified in the sample met the proficiency requirements as set by the department of education. Another suggested indication is that teacher-made assignments, projects, activities, and tests were based on grade level CRCT performance-standards that ultimately impacted student achievement. In other words, students were exposed to mathematical concepts that were relevant to seventh grade math CRCT standards. As a result, students were able to successfully demonstrate performance of those concepts in the classroom through activities and assignments before exposure to the actual CRCT.

Thus, the significant relationship found between the variables of final math grade of 70 or above and student achievement on the math CRCT was perhaps that students with disabilities responded successfully—some with the access to the basic function calculator—to teacher-implemented classroom requirements and tasks for mathematics at the seventh grade level.

However, this study was driven by the main question of whether or not there was a significant difference in the performance of students with disabilities on the math CRCT between those with access and those without access to the basic function calculator. The SPSS analysis found there was no significant difference in the performance of students with disabilities on the math CRCT between the group with access and the group without access to the basic function calculator. However, in all respect to SPSS, the researcher points to the sample size of 52 that it may have had an adverse effect on significance in SPSS for this study and thus, resulted in several statistical findings that indicated no significant relationships or differences between the variables.
A closer look of the data found, students with access to the calculator performed at a higher proficiency rate than students without access to the calculator. For instance, it was found that a difference of 14% more students with access to the basic function calculator achieved proficiency on the math CRCT than students without access to the basic function calculator. In other words, 62% (18/29) of the students with access to the calculator achieved a CRCT score of 800 or above compared to 48% (11/23) of the students without access to the calculator.

The SPSS analysis used to determine whether students having a particular type of disability in groups with and without access to the calculator found there was no significant difference in the performance of the students, according to the math CRCT scores. Yet, from a different perspective, the researcher would propose that a difference of 21% more students with learning disabilities achieved proficiency on the math CRCT with access to the basic function calculator (14/21) than learning disabled students without access to the basic function calculator (9/20). In other words, 66% of the students with learning disabilities and access to the calculator achieved a CRCT score of 800 or above compared to 45% with the same disability type without access to the calculator. From a given point of view, the accommodation of the calculator on the math CRCT made a difference in the achievement of students with access.

There were no significant differences between the performance of the students with and without access to the basic function calculator on the math CRCT in the disability categories of other health impairments, and emotional behavioral disturbances. Of course, those two groups were smaller than the group of students with learning
disabilities and, it has already been offered that smaller samples may result in "no significant differences or relationships" between variables.

The set of teacher perspectives that were analyzed was critical to the results of this study as it permitted the examination of vital responses from math teachers in three categories of qualifications. Math teachers with the higher ranked level of degree—beyond Master's level—returned most favorable opinions at a higher scale (from 26 to 29 out of 30 or from 86 to 96% approval rating) about the practices of collaborative planning sessions at the urban middle school. Favorable opinions about collaborative planning also streamed from math teachers at the Bachelor's level but, math teachers at the Master's degree level suggested the least favorable rating for collaborative planning sessions.

In regard to staff development opportunities, it was found that math teachers at all levels of qualifications were in agreement at a rating from 18 to 23 out of the possible 35 points or an approval rating from 51 to 65%. It was found that math teachers had the perspective that there was a lack of staff development opportunities to train with colleagues throughout the district to experience cross-cultural views on teaching and learning strategies. Another indication of the perspectives of math teachers was that staff development opportunities were preferred held during regular work hours as opposed to after work hours.

Finally, parental involvement and participation were found to be perceived by math teachers surveyed in this study with an approval indicator from eight to 11 out of 25 points or from 32 to 44%. Low ratings in regard to parental involvement were based on
point of contact with parents, awareness of student progress, and parental turn-out for school-based activities.

Conclusions

Classroom performance of students with disabilities in the core subject of mathematics has a significant relationship to student performance and achievement on the math CRCT. The basic function calculator may indeed represent significance as a viable intervention for the performance of students with disabilities on the math CRCT. However, it is important that the influence of student achievement which is ideally based on professional practices of general and special education math teachers are aligned to the needs of teachers rather than the qualifications of teachers.

Implications

1. The relationship between the final classroom numeric grade in mathematics and student success on CRCT was related to the alignment of mathematics instructions and CRCT standards.

2. An achievement score of 800 or above on the math CRCT is likely to be obtained for students with disabilities with access to the basic function calculator compared to those without access to the same calculator.

3. There are no differences between the performance of male and female students with disabilities with or without access to the basic function calculator on the Georgia Math CRCT.
4. The socioeconomic status of free and reduced lunch has no significance or impact to student performance on the math CRCT of student with disabilities identified in this study.

5. Math teachers with higher educational levels of qualifications facilitate collaborative planning sessions and are most likely to approve the agenda and procedures of the sessions at the study’s middle school site.

6. Math teachers with a bachelor’s degree have a more favorable view of the study’s middle school site professional development practices than math teachers with a master’s degree.

7. Parental involvement is low due to the lack of an established communications system between teachers and parents at the urban middle school identified in this study.

Limitations of the Study

1. Sample size constricted to: 52 students with disabilities; 11 math teachers; and one urban middle school.

2. The location lacked diversity due to demographics and socioeconomic factors that were similar throughout the urban middle school setting.

3. Access to electronic and manual data that pertained to other middle schools in the district restricted to the urban middle school identified in this study.
Recommendations

The following recommendations are centered on the findings of this study in regard to educational policies, mathematics teachers and teacher practices, leaders, and further research.

State Educational Policies

1. Improve current policy for calculator usage accommodation on state standardized assessments by considering the change from conditional to unconditional access on the math CRCT; this will allow more students with disabilities student achievement opportunities.

2. Increase student achievement in mathematics for students with disabilities through individualized assessments that measure performance of students at grade levels based on psychological-educational evaluations rather than current grade-level state-curricular standards.

Local District Policies

1. Improve student achievement for students with disabilities by adjusting proficiency performance scales for CRCT mathematics from 800 to 790 in consideration of academic challenges such as short-term memory, intellectual processing deficits, dyscalculia, and other challenges that hinder performance compared as nondisabled peers.
Educators

1. Improve classroom instruction in mathematics for general and special education teachers in the following ways: (a) identify accommodations in IEP for each student on class roster; (b) provide classroom instructions in mathematics to students with access to the calculator to ensure familiarization and proper utilization for math CRCT; and (c) provide daily review of skills of mathematical concepts to assess academic progress of students without access to the calculator on CRCT, according to IEP.

2. Improve student achievement at local school as special educators: (a) encourage general educators of mathematics to adhere to classroom and testing accommodations for each student—in the case that a special educator is not present during instruction; (b) special educators should demonstrate alternative instructional teaching strategies that complement the ability and learning style of students with disabilities; (c) both general and special educators should maintain a library of resources to help students build weak mathematical skills; and (d) develop lessons that will engage learners and reinforce, re-teach, and remediate skills in mathematics for students with and without access to the calculator.

Educational Leaders

1. Improve perspectives of math teachers at all levels of qualifications in regard to professional practices at local school: (a) assess needs of teachers for collaborative planning sessions, and staff development opportunities, and
(b) rotate math teachers on a bi-monthly schedule to represent local school at other schools within the district for collaborative planning and staff development sessions and return with new concepts and ideas that benefit student achievement. This recommendation is based on the results of the teacher survey-questionnaire where responses were below the 70% margin and ranged from 32 to 65% approval rating on two out of three educational practices that impact student achievement.

2. Improve parent participation and involvement at the school with: (a) improve communications between teachers and parents through information systems that include school web-site, recorded telephone messages, electronic messaging, and school newsletters; (b) parent volunteers as teacher helpers, hall and restroom monitors; (c) parent workshops that will benefit students with homework and projects; and (d) seek funding or a grant to initiate a night school project that will redeliver the instructional standards taught to students during regular school hours to parents after school hours. Parents will be empowered to help their children with problem solving strategies that develop better critical thinking skills and, methods to find solutions. The night school project could involve compensation for math teachers as an incentive and, teachers of all core subjects would be involved.
Further Research

Additional research is recommended for the following reasons:

1. To investigate other variables that include other types of accommodations that may impact student achievement on the math CRCT for students with disabilities;

2. To investigate and compare student achievement on the math CRCT for students with disabilities across diverse schools, locations, and demographics within the district;

3. To investigate and compare student achievement between students with disabilities and access to the basic function calculator and students without disabilities and without access of the calculator on the math CRCT;

4. To investigate student achievement between students with disabilities across other districts and determine best practices for student achievement on the math CRCT.

Summary

SPSS was used to provide descriptive statistical analyses for each of the 13 research questions posed in this study. Descriptive analyses were conducted through the Independent Samples t-test, one-way ANOVA, Pearson’s correlations test, and Cross Tabulations. Student achievement was determined as the primary dependent variable throughout the analyses. The findings indicated there were some significant relationships between the variables and student achievement. Specifically, following the input of several student-relevant variables a significant relationship was found between the final
numeric math grades of students and student achievement on the math CRCT. The explanation for this finding was based on the empirical knowledge of the researcher that collaborative efforts of general and special education math teachers to plan and deliver standards-based lessons, teacher-made assignments, projects, activities, and tests in mathematic had resulted in the significant relationship between the two variables.

The accommodation of the basic function calculator was found to be a viable intervention that impacted on the number of students to achieve CRCT scores of 800 or above compared to the number of students to achieve 800 without the support of the accommodation. In the findings of all analyses set to determine student achievement for students sampled in this study, about one half more students with access to the calculator were successful than those students without access.

In regard to the perspectives of mathematics teachers, responses were provided through a survey-questionnaire constructed in consultation with members of the research committee as a Likert (1932) five-point scale instrument. On the survey-questionnaire, teacher qualifications ranged from the bachelor's degree level with less than 10 years of experience to beyond master's degree level with more than 10 years of experience. It was concluded through the analyses that the approval ratings of math teachers in regard to certain professional practices varied. However, math teachers at the beyond Master's degree level responded more favorably about collaborative planning sessions than about the design and purpose of staff development workshops or parental involvement and participations. Math teachers that were least favorable about professional practices tend to have mid-ranked qualifications at the Master's degree level.
In context, this study was a quantitative design to determine whether the basic function calculator and other student-relevant variables had a viable impact on student achievement on the Georgia math CRCT for seventh grade students with disabilities. Additionally, this study analyzed the perspectives of math teachers to determine the consensus of mathematics teachers in regard to educational practices that may impact student achievement. Several variables were identified to gather student and teacher-relevant data. A schematic design on page 35 describes the alignment of the variables to conduct the investigation for this study.

Limitations that may have had an adverse effect on this study, implications about the findings, recommendations to improve educational policies and services, professional practices for math teachers and educational leaders, and suggestions for further research have been discussed for the improvement of student achievement of students with disabilities.

This study was approved by the Institutional Review Board of Clark Atlanta University of Atlanta, Georgia, and the local district’s assessment and accountability department of which this study was fulfilled. Participants of the study consisted of 52 seventh grade students with specific learning disabilities, other health impairments, and emotional behavioral disturbances out of a population of approximately 800 students and 11 mathematics teachers from one urban middle school in the Atlanta metropolitan area. The integrity and identities of all participants remained anonymous throughout the investigation and data collection procedures conducted for this study.
## APPENDIX A

### Demographics: Urban Middle School as of 2011 Profiles Report

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Enrollment</td>
<td>890</td>
<td>856</td>
<td>893</td>
<td>959</td>
<td>956</td>
<td>1,017</td>
<td>1,089</td>
<td>1,278</td>
<td>1,228</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ethnicity/Race</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Asian/Pacific Islander</strong></td>
<td>1%</td>
<td>1%</td>
<td>2%</td>
<td>2%</td>
<td>2%</td>
<td>2%</td>
<td>1%</td>
<td>0%</td>
<td>0%</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Black/African American</strong></td>
<td>76%</td>
<td>77%</td>
<td>78%</td>
<td>79%</td>
<td>83%</td>
<td>82%</td>
<td>81%</td>
<td>80%</td>
<td>82%</td>
<td>0%</td>
<td>0%</td>
</tr>
<tr>
<td><strong>Hispanic</strong></td>
<td>19%</td>
<td>17%</td>
<td>16%</td>
<td>16%</td>
<td>14%</td>
<td>12%</td>
<td>12%</td>
<td>12%</td>
<td>10%</td>
<td>0%</td>
<td>0%</td>
</tr>
<tr>
<td><strong>Multiracial</strong></td>
<td>2%</td>
<td>2%</td>
<td>2%</td>
<td>2%</td>
<td>1%</td>
<td>1%</td>
<td>2%</td>
<td>3%</td>
<td>2%</td>
<td>2%</td>
<td>0%</td>
</tr>
<tr>
<td><strong>Native American</strong></td>
<td>0%</td>
<td>0%</td>
<td>0%</td>
<td>0%</td>
<td>0%</td>
<td>0%</td>
<td>0%</td>
<td>0%</td>
<td>0%</td>
<td>0%</td>
<td>0%</td>
</tr>
<tr>
<td><strong>White/Non-Hispanic</strong></td>
<td>2%</td>
<td>2%</td>
<td>2%</td>
<td>2%</td>
<td>1%</td>
<td>2%</td>
<td>3%</td>
<td>5%</td>
<td>5%</td>
<td>0%</td>
<td>0%</td>
</tr>
<tr>
<td>Other Subgroups</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Free/Reduced Lunch</strong></td>
<td>89%</td>
<td>90%</td>
<td>85%</td>
<td>87%</td>
<td>87%</td>
<td>87%</td>
<td>81%</td>
<td>82%</td>
<td>88%</td>
<td>0%</td>
<td>0%</td>
</tr>
<tr>
<td><strong>Limited English Prof</strong></td>
<td>4%</td>
<td>4%</td>
<td>3%</td>
<td>3%</td>
<td>5%</td>
<td>4%</td>
<td>4%</td>
<td>2%</td>
<td>1%</td>
<td>*</td>
<td>*</td>
</tr>
<tr>
<td><strong>Special Education</strong></td>
<td>13%</td>
<td>14%</td>
<td>15%</td>
<td>16%</td>
<td>14%</td>
<td>14%</td>
<td>12%</td>
<td>12%</td>
<td>14%</td>
<td>0%</td>
<td>0%</td>
</tr>
<tr>
<td><strong>Migrant</strong></td>
<td>0%</td>
<td>0%</td>
<td>0%</td>
<td>0%</td>
<td>0%</td>
<td>0%</td>
<td>0%</td>
<td>*</td>
<td>*</td>
<td>*</td>
<td>*</td>
</tr>
</tbody>
</table>

124
APPENDIX B

Urban Middle School CRCT Performance Levels

7th Grade - Georgia Criterion-Referenced Competency Tests (CRCT)
Percentage of Students with Disabilities at Core Subject Performance Levels

### 2010-11

<table>
<thead>
<tr>
<th>Subject</th>
<th>0</th>
<th>20</th>
<th>40</th>
<th>60</th>
<th>80</th>
<th>100</th>
<th>120</th>
<th>140</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mathematics</td>
<td>59</td>
<td>15</td>
<td>20</td>
<td>25</td>
<td>30</td>
<td>35</td>
<td>45</td>
<td>50</td>
</tr>
<tr>
<td>Reading</td>
<td>72</td>
<td>30</td>
<td>40</td>
<td>45</td>
<td>50</td>
<td>55</td>
<td>60</td>
<td>65</td>
</tr>
<tr>
<td>English Lang. Arts</td>
<td>74</td>
<td>50</td>
<td>50</td>
<td>55</td>
<td>60</td>
<td>65</td>
<td>70</td>
<td>75</td>
</tr>
</tbody>
</table>

### 2009-10

<table>
<thead>
<tr>
<th>Subject</th>
<th>0</th>
<th>20</th>
<th>40</th>
<th>60</th>
<th>80</th>
<th>100</th>
<th>120</th>
<th>140</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mathematics</td>
<td>59</td>
<td>15</td>
<td>20</td>
<td>25</td>
<td>30</td>
<td>35</td>
<td>45</td>
<td>50</td>
</tr>
<tr>
<td>Reading</td>
<td>72</td>
<td>30</td>
<td>40</td>
<td>45</td>
<td>50</td>
<td>55</td>
<td>60</td>
<td>65</td>
</tr>
<tr>
<td>English Lang. Arts</td>
<td>74</td>
<td>50</td>
<td>50</td>
<td>55</td>
<td>60</td>
<td>65</td>
<td>70</td>
<td>75</td>
</tr>
</tbody>
</table>

### 2008-09

<table>
<thead>
<tr>
<th>Subject</th>
<th>0</th>
<th>20</th>
<th>40</th>
<th>60</th>
<th>80</th>
<th>100</th>
<th>120</th>
<th>140</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mathematics</td>
<td>59</td>
<td>15</td>
<td>20</td>
<td>25</td>
<td>30</td>
<td>35</td>
<td>45</td>
<td>50</td>
</tr>
<tr>
<td>Reading</td>
<td>72</td>
<td>30</td>
<td>40</td>
<td>45</td>
<td>50</td>
<td>55</td>
<td>60</td>
<td>65</td>
</tr>
<tr>
<td>English Lang. Arts</td>
<td>74</td>
<td>50</td>
<td>50</td>
<td>55</td>
<td>60</td>
<td>65</td>
<td>70</td>
<td>75</td>
</tr>
</tbody>
</table>
APPENDIX C

Survey/Questionnaire

Teacher perspectives – Please select your answer choice to each statement below

<table>
<thead>
<tr>
<th>Independent Variable Components</th>
<th>Indicators – Circle one choice to rate your perspective</th>
<th>Yes</th>
<th>No</th>
</tr>
</thead>
<tbody>
<tr>
<td>Teacher Quality</td>
<td>1. I hold a clear and renewable Georgia special educator’s certificate to teach mathematics.</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>2. I hold a clear and renewable Georgia educator’s certificate to teach middle grades mathematics.</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>3. My experience is between 1 and 10 years teaching mathematics.</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>4. My experience is more than 10 years of teaching mathematics.</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>5. My highest degree is ranked Bachelor’s.</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>6. My highest degree is ranked Master’s.</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>7. My highest degree is ranked beyond Master’s.</td>
<td>1</td>
<td>2</td>
</tr>
</tbody>
</table>

1 = Never; 2 = Rarely; 3 = Occasionally; 4 = Frequently; 5 = Very Frequently

<p>| Collaborative Planning          | 1. General and special education math teachers meet weekly to plan and discuss lessons, curriculum, strategies, and instructional pacing. | 1   | 2  | 3 | 4 | 5 |
|                                | 2. An agenda guides productive collaborative meetings | 1   | 2  | 3 | 4 | 5 |
|                                | 3. General and special ed. teachers discuss lesson plans to guide instruction. | 1   | 2  | 3 | 4 | 5 |
|                                | 4. Student achievement and misconceptions guide teacher instructional strategies. | 1   | 2  | 3 | 4 | 5 |
|                                | 5. Special educators say math curriculum is too difficult for students with disabilities. | 1   | 2  | 3 | 4 | 5 |
|                                | 6. General and special ed. teachers plan for students with and without disabilities to collaborate at least once per week. Revised | 1   | 2  | 3 | 4 | 5 |</p>
<table>
<thead>
<tr>
<th>Staff Development</th>
<th>1= Never; 2 = Rarely; 3 = Occasionally; 4 = Frequently; 5 = Very Frequently</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Staff development workshops are focused on building teacher’s content knowledge for student achievement.</td>
<td>1 2 3 4 5</td>
</tr>
<tr>
<td>2. Staff development workshops include opportunities to discuss and model teaching strategies.</td>
<td>1 2 3 4 5</td>
</tr>
<tr>
<td>3. The majority of staff development sessions are held in face-to-face settings during school hours</td>
<td>1 2 3 4 5</td>
</tr>
<tr>
<td>4. Staff development is held with teachers across different school zones in the district to allow cross-cultural views.</td>
<td>1 2 3 4 5</td>
</tr>
<tr>
<td>5. Quality instruction is provided during staff development that is easily transferrable to classroom practice.</td>
<td>1 2 3 4 5</td>
</tr>
<tr>
<td>6. I believe there is a relationship between staff development sessions and student achievement.</td>
<td>1 2 3 4 5</td>
</tr>
<tr>
<td>7. Staff development workshops are generally a waste of valuable instructional time.</td>
<td>1 2 3 4 5</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Parental Involvement</th>
<th>1= Never; 2 = Rarely; 3 = Occasionally; 4 = Frequently; 5 = Very Frequently</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Majority of parents make appointments with teachers to discuss student progress</td>
<td>1 2 3 4 5</td>
</tr>
<tr>
<td>2. Majority of parents correspond with teachers via e-mail to keep track of student progress.</td>
<td>1 2 3 4 5</td>
</tr>
<tr>
<td>3. Majority of parents participate in school based activities (i.e.: PTSA, math workshops, and learning activities) to help students with CRCT strategies.</td>
<td>1 2 3 4 5</td>
</tr>
<tr>
<td>4. Most parents visit classrooms as volunteers during math instruction.</td>
<td>1 2 3 4 5</td>
</tr>
<tr>
<td>5. Parents readily provide updated telephone numbers for point of contact in regard to student progress, discipline, behavior and, attitude.</td>
<td>1 2 3 4 5</td>
</tr>
</tbody>
</table>
APPENDIX D
Informed Consent

Clark Atlanta University

Study Title: The Basic Function Calculator and Factors of Other Variables That May Impact Achievement on the Georgia Math CRCT for Students with Disabilities

You are invited to be in a research study that examines the performance of middle school students with disabilities on the math CRCT. You were selected as a possible participant because of your position as a mathematics teacher at one of the Fulton County Schools identified in this study. We ask that you read this form and ask any questions you may have before agreeing to be in the study.

This study is being conducted by: Willie White-Martin, a graduate student at Clark Atlanta University.

Background Information
The purpose of this study is to determine whether or not the basic function calculator along with additional factors have significant roles for the success of students with disabilities on the math CRCT. A number of research questions have been designed to guide this study. The questions are designed as a survey to collect the perspectives of teachers in respect to years of experience, staff development, collaborative planning, and parental involvement. The results of the survey will be used to determine the relationship between teacher quality and teacher perspectives of professional practices that may impact student performance.

Procedures
If you agree to be in this study, we would ask you to complete a teacher survey-questionnaire. Approximately 10 minutes of your time are needed to complete the survey-questionnaire. Participants will be asked to complete the survey once. A manila envelope will enclose the survey-questionnaire. The envelope with the teacher survey-questionnaire will be hand-delivered to each participant at each school identified in this study. Your individual survey questionnaire will be coded to guarantee your responses and identities are anonymous throughout the course of this study. Upon completion of the survey-questionnaire, participants will be asked to insert the survey into the receiving manila envelope, and to seal the envelope with cellophane tape or staples.

The researcher will request a two-day reply from each participant. At the end of the two-day period, the researcher will return to each school and collect the survey questionnaires from the participants. In the event, the surveys are not ready for pick up after the two-day period, an additional two days will be granted to the participants. At the end of the second two-day period, the researcher will attempt to collect the survey for the second and final event.
Appendix D (continued)

Compensation
A total of three $25 School Box gift cards will be raffled in appreciation for your participation in this teacher survey-questionnaire. A drawing will be held within a week’s time-line in the presence of each group of participants at each identified school after all surveys are collected. The set time will be arranged and determined to accommodate each group of participants.

Risks and Benefits of Being in the Study
We do not believe, expect or anticipate any danger, threats, risks or harm will be experienced or encountered by any of the volunteer participants of this study. Rather, this study will benefit the community of educators to make better decisions about the provisions of accommodations that may positively affect the achievement of students with disabilities on performance-based tests such as the Georgia Math CRCT.

Confidentiality
The records of this study will be kept private. In any sort of report we might publish, we will not include any information that will make it possible to identify a participant. Research records will be kept in a locked file; only the researchers will have access to the records. The Teacher Consent Form and Survey-Questionnaire will be secured and stored for three years. At the end of the third year, both consent form and questionnaire will be shredded and destroyed to maintain the anonymity of the participants.

Voluntary Nature of the Study
Your decision whether or not to participate will not affect your current or future relations with the researcher or with Clark Atlanta University. Your decision to participate is completely voluntary, and participants have the freedom to withdraw at any time without affecting those relationships previously identified. In the event a participant decides to withdraw from this research study, the participant is asked to contact the researcher by e-mail at williewhitemartin@yahoo.com. Please note that at the time of withdrawal from the study, the participant will not be eligible for any form of compensation as described above. However, a letter of appreciation will be forwarded to the withdrawing participant for the voluntary consideration to partake in this research study. Any data collected from a withdrawing participant will not be used in the data collection process, but will be immediately destroyed or shredded.

Contacts and Questions
The researcher conducting this study is: Willie White-Martin. You may ask any questions you have now: If you have questions later about the research, you may contact the researcher(s) at: (404) 431-3645. You may also send an e-mail to the researcher at williewhitemartin@yahoo.com. You may also contact the researcher’s advisor: Dr. M. Norman at Clark Atlanta University, Educational Leadership Department at: (404) 880-6015. If you have any questions now, or later, related to the integrity of the research, (the rights of research participants), you are encouraged to contact Dr. Georgianna Bolden at the Office of Sponsored Programs (404 880-6979) or Dr. Paul I. Musey, (404) 880-6829 at Clark Atlanta University.

This study has been approved by the Institutional Review Boards (IRB) of CAU and Fulton County Schools.

I hereby agree to participate in the above study with the understanding that any information that pertains to my identity will not be disclosed and will remain anonymous.

Signature: _______________________________ Date: __________________
Printed: _______________________________
<table>
<thead>
<tr>
<th>Students</th>
<th>Gender</th>
<th>*Disability</th>
<th>2011 CRCT Scores</th>
<th>Accommodations w/Calc</th>
<th>Accommodations w/o Calc</th>
<th>**2011 Math Grades (Numerical)</th>
<th>180-Days Attendance</th>
<th># Absent Days</th>
<th>SES-Free &amp; Reduced Lunch</th>
<th>VN</th>
<th>Teacher</th>
<th>Teacher Quality</th>
<th>Staff Development</th>
<th>Collaborative Planning</th>
<th>Parental Involvement</th>
</tr>
</thead>
</table>

*Disabilities: LD – learning disability; EBD – emotional behavioral disturbance; ADHD – attention deficit hyperactive disorder. **District’s
REFERENCES


