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The Implications Of A High Academic Ability Learning Environment On Third Grade Gifted Students' Academic Achievement In Florida Public Schools

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THE IMPLICATIONS OF A HIGH ACADEMIC ABILITY LEARNING ENVIRONMENT ON THIRD GRADE GIFTED STUDENTS' ACADEMIC ACHIEVEMENT IN FLORIDA PUBLIC SCHOOLS

by

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ABSTRACT

The purpose of this two year study was to investigate the implications of a high academic ability learning environment on the achievement scores of third grade gifted students who attended the Florida Brevard County Public School System. Learning environment was defined by the students' academic ability level, whether high academic ability or heterogeneous academic ability, and for this study was the independent variable. Academic achievement, as measured by the 2011 and the 2012 Florida Comprehensive Assessment Test® 2.0 (FCAT 2.0) Mathematics and Reading Developmental Scale Scores (DSS), was the dependent variable. Other student data such as gender and socioeconomic status were also collected and used along with classroom structure to examine the extent to which third grade gifted students' reading and mathematics performance could be predicted. Random samples of students were drawn from the third grade gifted student population attending Florida Brevard County Public School System in the 2010-2011 and the 2011-2012 school years.

Using an independent samples t-test, analysis of the 2011 FCAT 2.0 Reading and Mathematics found a statistically significant difference in both the students' FCAT 2.0 Mathematics and the students' FCAT 2.0 Reading achievement test scores based on the classroom structure. Specifically, there was enough evidence to support the claim that third grade gifted students who learned in a homogeneous high academic ability learning environment scored significantly higher on reading and mathematics standardize tests than did third grade gifted students who learned in a heterogeneous academic ability learning environment. Approximately 14% of the variance in reading and mathematics scores could be accounted for by classroom structure. However, different results were found with the 2012 FCAT 2.0

Mathematics and Reading scores. The results from the 2011-2012 school year indicated that there was not a significant difference in mean reading and mathematics scores between third grade gifted students who learn in a homogeneous high academic ability learning environment and third grade gifted students who learn in a heterogeneous academic ability learning environment.

The recommendations include that subsequent studies incorporate a wider range of grade levels, perhaps even include methods of instructional delivery, types of gifted services provided, and teachers' years of experience. In addition, recommendations are that future studies address the academic performance of high academic ability non-gifted students who learn in homogeneous high academic ability classroom environments verses those who learn in heterogeneous academic ability classroom structures.

This research is dedicated to my parents, George and Frances Klein. First, in loving memory of my mother, Frances Fern Klein, who was my best friend, my confidante, and though physically she will not end this journey with me, her loving spirit remains with me and strengthens my determination. And second, to my father, George Edward Dell Klein, who is always a staunch supporter of my many endeavors, and who through the entire doctoral program has given me financial and moral support. I could not have done it without them.

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Let us think of education as the means of developing our greatest abilities, because in each of us there is a private hope and dream which, fulfilled, can be translated into benefit for everyone and greater strength for our nation. ~John F. Kennedy

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LIST OF ACRONYMS/ABBREVIATIONS

DSS	Developmental Scale Scores
EAHCA	Education for All Handicapped Children Act
ELL	English Language Learners
FCAT 2.0	Florida Comprehensive Assessment Test® 2.0
FDOE	Florida Department of Education
GATE	Gifted and Talented Education
GSP	Gifted Student Program
IDEA	Individuals with Disabilities Education Act
IQ	Intelligence Quotient
IRB	Institutional Review Board
NAGC	National Association of Gifted Children
NCLB	No Child Left Behind Act
NGSSS	Next Generation Sunshine State Standards
NDEA	National Defense Education Act
NNAT	Naglieri Nonverbal Ability Test
NRC/GT	National Research Center on the Gifted and Talented
NSF	National Science Foundation
NSW	New South Wales
SES	Socioeconomic Status
SAT-M	SAT-Mathematics
SCT	Social Cognitive Theory

SI	Structure of Intellect
SPSS	Statistical Package for the Social Sciences
STEM	Scientists, Technologists, Engineers, and Mathematicians
UCF	University of Central Florida
URL	Universal Resource Locator
USDE	United States Department of Education

CHAPTER 1
INTRODUCTION

In the 1970s, there was a shift toward educating all children in a regular education classroom. This movement toward inclusion made it possible for every child, regardless of their diverse learning needs and or disabilities, to receive educational services from a general education teacher in a regular education classroom (Stainback & Stainback, 1996). During any given school year a general education teacher's student body may consist of students who had varying ranges of learning disabilities, autism spectrum disorders, behavior disorders, physical disabilities, Attention Deficit Hyperactivity Disorders, English as a Second Language, and cognitive abilities ranging from low-average to high-average as well as the highly gifted. Stainback acknowledges that the intent was for general education teachers and special educators to work together in a unified, consistent effort, using the necessary resources to meet the educational needs of the students (1996). Optimally, teachers were to have the needed training and resources as well as specialized staff continuously available to them and their students in order to meet their students' academic and social emotional needs within their classroom. However, when funding for resources and additional specialized staff was not available, it was often up to the general education teacher to meet all the academic needs of his or her diverse student population. Thus, teachers were challenged with responding to a broad range of learning needs and expected to provide effective instruction to each and every one of their students (Adams & Pierce, 2004). General education teachers were not only expected to accomplish this task but were held accountable for it. Serious consequences to low student performance on the state standardized academic tests prompted many schools to provide remediation programs for students who performed below average on the state assessments (Gallagher, 2004). According to Butterworth (2010), to comply with federal mandates , schools were rapidly becoming educational institutions where the verbal acknowledgement of student differences in learning pace and academic ability increased; while classroom actions continued to instruct to the state tests and lower to middle ability students, and in doing so, failed to address the academic needs of gifted students. A goal of general education teachers was to employ strategies and solutions to move their mild to severe learning disabled students, who negatively deviated from the average, to a proficient learning status. In a commentary, Tomlinson (2002) pointed out that it was this minimal expectation for achievement that emphasized baseline performance. This focus on minimal proficiency derailed educators' attention from our Nation's brightest students. In an article titled *The Uncommonly Bright Child,* Robinson wrote that the brightest and most academically capable students "have exceptional potential to produce something of great value. These are the children who are at risk for greatness" (1981, p. 1).

According to Holloway (2003), there were many options for schools when it came to meeting the needs of the gifted population. It was up to the administrative leadership at the schools to determine which learning environment best met the academic needs of their high academic ability students. Ultimately, it was their responsibility to maximize academic potential for gifted learners by providing for them the appropriate learning environment.

This study set out to examine the implications of a high academic ability learning environment on gifted students' academic achievement. Beyond the brief introduction, Chapter 1 includes the theoretical framework that supported the connection between the learning environment, cognitive factors, and behavior. The problem statement, the purpose for this study, and the significance of the study that follows, all point to the importance of providing educational leaders with research based information so that they can “strategically align instruction level to learning needs” (Raper, 2006, p. 2). In addition, Chapter 1 provides the research questions and null hypotheses as well as the delimitations, limitations and assumptions. Chapter 1 concludes with operational definitions, chapter summary, and an outline of the organization of the study.

Theoretical Framework

The theoretical underpinnings for this study lie in Albert Bandura’s Social Cognitive Theory (SCT). SCT provided the framework for understanding, vaticinating, and altering human behavior. Bandura (1986) identified human behavior as an interaction of personal factors, environmental factors, and behavior. He stated that SCT embraced “an interactional model of causation in which environmental events, personal factors, and behavior all operate as interacting determinants of each other” (Bandura, 1986, p. xi). Bandura posited that the interaction between each with the others caused each other; in other words, they were reciprocal. “In this model of reciprocal causation, action, cognitive, affective and other personal factors, and environmental events all operate as interacting determinants” (Bandura, 1989, p. 1175).

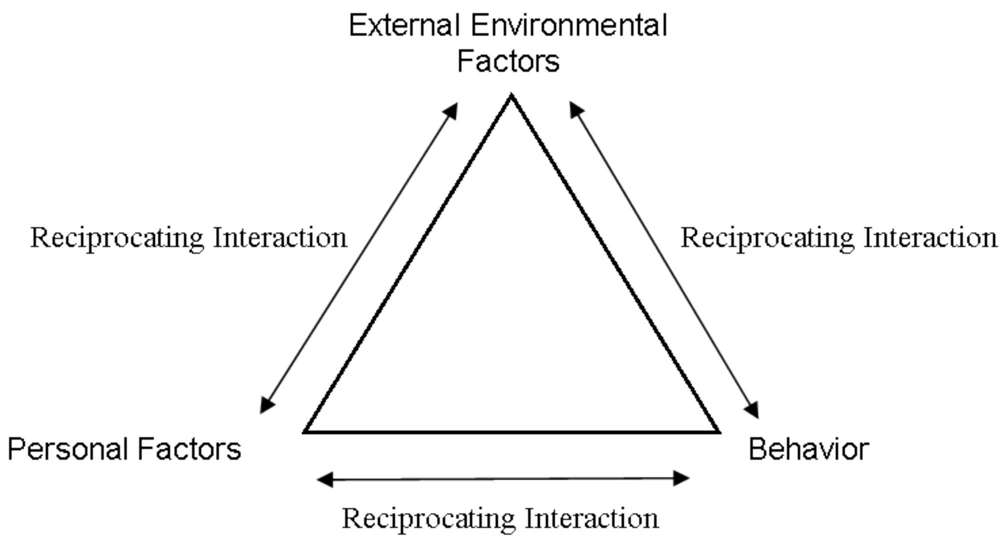

Figure 1: Triadic Model of Social Cognitive Theory's Reciprocating Interaction

The SCT triadic model shown in Figure 1 was adapted from Bandura (1986), and was used to show the reciprocating interactions between the three SCT influencing factors. The reciprocating influences of behavior, personal, and environmental factors did "not mean symmetry in the strength of bidirectional influences" (Bandura, 1986, p. 24). Bandura also pointed out that the patterning and strength of the mutual influences were not fixed in reciprocal causation. The exerting influences varied based on different circumstances, individuals, and activities.

Davis (2006) described the SCT model in three reciprocating causations. The first was an interaction between the person and the person's behavior. That involved the influences of a person's thoughts on the person's actions and the influences of a person's actions on the person's thoughts. The second was an interaction between the person and the environment. That involved human beliefs and cognitive competencies, each developed and changed due to social influences and environmental structures. The third interaction was between the environment and behavior. That involved a person's behavior determining aspects of the person's environment and the person's environment causing the person's behavior to be modified. Bandura (1989) connected the triadic reciprocal causation of the SCT to learning through the "cognitive, vicarious, self-reflective, and self-regulatory processes" (p. 1175). He posited that "human thought is a powerful instrument for comprehending the environment and dealing with it" (Bandura, 1986, p. xi).

Pajares (2002) stated that individuals learn from their own experiences as well as observing the behaviors of others. Pajares also wrote that human behavior is not directly affected by factors such as socioeconomic status, familiar and educational structure, and economic conditions. He suggested instead that these factors influenced individual's self-efficacy beliefs, aspirations, personal standards, and other self-regulatory determinates such as emotional state. These processes in turn ascribed learning motivation in students (Pajares, 2002). Bandura (1989) stated that "people who believe strongly in their problem-solving capabilities remain highly efficient in their analytic thinking in complex decision-making situations" (p. 1176). Furthermore, "self-efficacy beliefs affect" behavior, and behavior "regulated by forethought embodying cognized goals" (Bandura, 1989, p. 1175). If goals were challenging they had the potential to raise the level of motivation and performance accomplishments.

Within the context of gifted learning, Burney (2008) pointed out that SCT reflected the interaction between student motivation, behavior, and environment. The learning environment, which could be both social and physical, had the capacity to provide students with many opportunities to observe, gain social support, and interact. Burney (2008) stated that while SCT generally applied to all learning it was also pertinent to the gifted learner's educational environment because educational opportunities available to children with advanced cognitive abilities may not have been designed with sufficient challenge to "foster the development of learning strategies needed for advanced learners" (p. 1). Bandura (1986) wrote about the enhancement of actions due to environmental effects in his book titled *Social Foundations of Thought and Action a Social Cognitive Theory*. He proposed that "even similarities in performance may sometimes result from attention-directing" and that the physical and social makeup of the environment could cause or elicit similar behaviors among observers in that setting (1986, p. 50).

Statement of the Problem

Studies, such as Riska (2010), showed that classroom structure was an avenue through which challenging high interest materials, in-depth studies, and advanced cognitive activities could be provided. According to Raper (2006), in a mixed ability or heterogeneous academic ability classroom structure the academic needs of some learners were abandoned to accommodate the academic needs or ability level of the majority. The academic needs of both high ability, which included gifted students, and low ability students were sacrificed and thus their learning impeded, (Fiedler, Lange, & Winebrenner, 1993). To date, there was limited current information concerning the implications of homogeneous grouping of gifted elementary students as it pertained to academic performance. Specifically, gifted elementary students who were taught in a homogeneous high academic ability classroom structure had not been compared to gifted elementary students who were taught in a heterogeneous academic ability classroom environment.

Purpose of the Study

The purpose of this study was to determine the difference, if any, the type of classroom structure had on third grade gifted students' reading and mathematics performance on standardized tests as well as examine the extent to which third grade gifted students' reading and mathematics performance could be predicted based on classroom structure, student gender, and students' socioeconomic status. For the purpose of this study, classroom structure was described as either a homogeneous high academic ability learning environment or a heterogeneous academic ability learning environment. The intent was to generate information about classroom structure to be used by district and school level administrators, gifted and general education teachers, and anyone else that determined policy and made educational decisions concerning the academic well-being of high academic ability learners. The desired outcome was that this information be used to establish the classroom structure that created the best learning environment for gifted students in order to maximize their academic potential.

Significance of the Study

The results of this study will render evidence to assist in understanding the type of classroom learning environment that is conducive for increasing the academic performance of gifted learners. As schools strived to meet the requirements of federal mandates such as the No Child Left Behind Act of 2001 (P.L, 107-110) (NCLB) they were obligated to create learning conditions that allowed all students to perform at their highest level (United States Department of Education (USDE), 2010). Yet, according to research findings, academically advanced students made the least gains in comparison to other students (Wright, Horn, & Sanders, 1997). Because of findings like these, some felt that allowing our nation's brightest children to take a backseat to the learning that occurred in public schools was a tragedy that could in the long run have devastating consequences for the United States. Gallagher and Gallagher (1994) put it succinctly when they wrote:

> Failure to help gifted children reach their full potential is a societal tragedy, the extent of which is difficult to measure but which is surely great. How can we measure the loss of the sonata unwritten, the curative drug undiscovered, or the absence of political insight? These gifted students are a substantial part of the difference between what we are and what we could be as a society. (p. 4)

This research study has the potential to assist educators in making appropriate decisions concerning the type of classroom structure they provide gifted students.

Research Questions

The statement of the problem was summarized by the question "To what extent does the reading and mathematics achievement of third grade gifted students differ based on classroom structure?" In addition to classroom structure, gender, and socioeconomic status was also examined; specifically, this research examined the extent to which third grade gifted students' reading and mathematics performance could be predicted based on classroom structure, student gender, and students' free and reduced lunch status. The following definitive research questions guided this study:

1. To what extent, if any, is there a difference in the third grade gifted student reading achievement scores based on classroom structure (homogeneous high academic ability verses heterogeneous academic ability)?

   H_0: There is no statistically significant difference in third grade gifted student reading achievement scores based on classroom structure (homogeneous high academic ability verses heterogeneous academic ability).

2. To what extent, if any, is there a difference in the third grade gifted student mathematics achievement scores based on classroom structure (homogeneous high academic ability verses heterogeneous academic ability)?

   H_0: There is no statistically significant difference in third grade gifted student mathematics achievement scores based on classroom structure (homogeneous high academic ability verses heterogeneous academic ability).

3. To what extent can third grade gifted student reading performance be predicted by classroom structure, gender, and socioeconomic status?

   H_0: There is no relationship between reading performance and classroom structure when controlling for gender, and socioeconomic status.

4. To what extent can third grade gifted student mathematics performance be predicted by classroom structure, gender, and socioeconomic status?

   H_0: There is no relationship between mathematics performance and classroom structure when controlling for gender, and socioeconomic status.

Delimitations

This study was delimited to the reporting of the 2011 and the 2012 Mathematics and Reading Developmental Scale Scores (DDS) for Brevard County public school third grade gifted students as measured by the Florida Comprehensive Assessment Test® 2.0 (FCAT 2.0). The study only included gifted students who attended public schools that had both 2010 and 2011 FCAT 2.0 third grade data available. In addition, this study was delimited by excluding assessment results from students who attended virtual or charter public schools. Furthermore, this study did not address the other variables besides classroom structure, gender, and socioeconomic status that have been shown to affect students' academic success such as students' attitudes on learning, attendance, behavior, ethnicity, home language, learning disabilities, and parental support.

Due to this study's delimitations the results may not be generalized to other grade levels besides third grade, to third grade gifted students in other schools besides Brevard County Florida public schools, or to other classroom structures besides homogeneous high academic ability and heterogeneous academic ability.

Limitations

The following were factors which limited the validity of this research:

1. the lack of information on the gifted instructional models implemented, if any, within the gifted third grade classes studied;
2. the restriction of the statistical calculations for third grade gifted students to those students who had both mathematics and reading third grade DDS for the 2010 or the 2011 FCAT 2.0; and
3. the potential for gifted students not being identified as gifted as early as third grade, and therefore, their DSS while qualifying to be used in this research would not be counted.

Assumptions

It was assumed that the student data produced from the FCAT 2.0 provided an accurate picture of student mathematics and reading academic achievement/performance.

Definition of Terms

1. *Academic ability level* is the intellectual or cognitive ability of the individual student and is based on their scores earned on standardized assessments.
2. *Active engagement* is the active participation of students in their learning process and could include, but is not limited to, problem-solving activities, inquiry-based learning, collaborative projects, presentations, discussions, and action research.
3. *Academic achievement* is what a student is able to do or achieve after engaging in the learning process. For the purpose of this study, academic achievement in reading and mathematics will be shown as students' DSS as measured on FCAT 2.0.
4. *Classroom structure,* for the purpose of this study, is a representation of students' cognitive abilities and whether or not students are in a homogeneous class of high academic ability learners or a general education class of heterogeneous academic ability learners (as operationally defined herein).
5. *Differentiated instruction* is a method of facilitating learning based on student's readiness level, interest, and preferred mode and style of learning. Educators use this information to determine for each student the pace of learning, what will be learned, how the student will learn it, and how the student will demonstrate his or her learning.
6. *Florida Comprehensive Assessment Test® 2.0,* also known as the FCAT 2.0, is a standardized criterion-referenced assessment that is annually administered statewide to all Florida's public school students in grades 3-11. FCAT 2.0 measures the proficiency in Next Generation Sunshine State Standards (NGSSS) in reading and

mathematics for grades 3-11, in writing for grades 4, 8, and 11, and in science for grades 5, 8, and 10 (FDOE – Office of Accountability, 2012).

7. *Gifted student or certified gifted student* is a student who in the state of Florida demonstrates superior intellectual development as determined by their intelligence quotient, 130 or greater, which must be at least two standard deviations or more above the mean score of a standardized intelligence test. They must also demonstrate a need for a special program and display a majority of the gifted student characteristics as indicate on a standard scale checklist. It should also be noted that eligibility is determined by the state of Florida in accordance with Florida Administrative Code Rule 6A-6.03029(2)A. Furthermore, the State requires school districts to develop alternative eligibility criteria for the underrepresented to increase their representation in the gifted population (State of Florida Department of Education, 2002). From this point forward certified gifted students will be referred to as gifted students.
8. *High academic ability* describes a learner who demonstrates advanced cognitive abilities as recognized in gifted and high achieving students.
9. *Heterogeneous academic ability or mixed ability* describes a classroom structure that includes students whose cognitive abilities range from low-average to high-average as well as the highly gifted.
10. *Homogeneous high academic ability* describes a classroom structure that is populated by gifted and high academic ability students. For the purpose of this study, a homogeneous high academic ability classroom structure will have, at a minimum, at

least 9 gifted students enrolled in the class. Nine gifted students represent at least half of a third grade classroom student population. During this two year study, Florida State mandated a maximum third grade class size of no more than 18 students.

11. *Low socioeconomic status,* see socioeconomic status.
12. *Mathematics achievement scores* are the Developmental Scale Scores (DSS) on 2010 and 2011 FCAT 2.0 Mathematics assessments.
13. *Next Generation Sunshine State Standards* (NGSSS) are benchmarks which make up Florida's curriculum framework. At each grade level, these standards guide instruction for each subject, and are what students should know and be able to perform. FCAT 2.0 measures the mastery of these standards (FDOE – Office of Accountability, 2012).
14. *Reading achievement scores* are the Developmental Scale Scores (DSS) on 2010 and 2011 FCAT 2.0 Reading assessments.
15. *Socioeconomic status* for the purpose of this study refers to whether a student receives free, reduced cost, or full priced school lunch. The cost or non-cost of school lunch is based on family income. The qualifying poverty limits placed on family income are set by the United States Department of Agriculture (USDA) Food and Nutrition Service and are printed in the Child Nutrition Programs-Income Eligibility Guidelines. A low socioeconomic status would refer to a student who receives either free or reduced cost lunch.

16. *The Jacob Javits Gifted and Talented Students Education Act* is legislation that was enacted to provide funding for instructional programs designed to meet the special academic needs of gifted and talented students (USDE, 2012).

17. *The No Child Left Behind Act* is legislation that was enacted to ensure that by the year 2014 every child would be proficient in mathematics and language arts, as measured by standardized state assessments (USDE, 2010).

Summary

Researchers agreed that gifted students needed challenging educational experiences; however, they disagreed on how to provide educational services to them (Riska 2010; Stainback & Stainback, 1996; Renzulli & Reis, 1997; Gross, 2000; Tomlinson, 2002; Raper, 2006; Westberg & Daoust, 2002; Adams & Pierce, 2004). Some were in favor of providing them a homogeneous high academic ability learning environment, and other researchers felt that a heterogeneous academic classroom structure was a better learning environment. This research study compared the reading and mathematics scores of gifted third grade students taught in a homogeneous high academic ability classroom structure with the reading and mathematics scores of gifted third grade students taught in a heterogeneous academic ability classroom structure. In addition, the relationship between student performance, classroom structure, gender, and socioeconomic status was examined. Expanding on previous research, this study provides educational leaders with data to make informed and responsible decisions concerning the learning environments of high academic ability students.

Organization of the Study

Divided into five chapters, this research document begins with Chapter 1, the introduction to the study. The introduction includes a brief overview of the study, the underlying theoretical framework, the problem statement, a statement of purpose for conducting the study, and the significance for completing the study. Also, included in Chapter 1 are the following components: the related research questions and hypotheses, the study’s delimitations, limitations, and assumptions, definitions of important terms, and lastly, the summary and organization of the study. Chapter 2 presents a review of the literature and research related to the problem statement. Chapter 3 gives a detailed look at the methodology that was used to conduct the study, including a review of the research questions and related hypotheses, the research design, description of the population and sample, and summary of the chapter. Chapter 4 presents the results obtained from running the statistical analysis on the data. Chapter 5 provides the findings of the study as well as an analysis of the statistical results. Also, included in Chapter 5 are recommendations based on this study’s findings.

CHAPTER 2
REVIEW OF LITERATURE

When locating studies, dissertations, and articles pertaining to gifted learning one has a plethora of gifted topics from which to choose; from teachers' perspectives on educating the gifted student (Palladino, 2008) to guidelines for implementing differentiated instruction for gifted learners (Marland, 1972). For this review, the information gleaned from these resources covered a geographical area from rural and urban studies dealing with gifted practices in Pennsylvania schools (Maguire, 2008) to international studies, encompassing "experiences and educational needs of American students" as well as "aspects of gifted education internationally" (Webber, 2010, p. 25). Most boasted research results, expert advice, and even a varying of opinion. The information provided in this review was accessed through the following databases: Eric, Education Full Text, Web of Science, PsycInfo, and ProQuest Dissertations. Stipulating "gifted," "gifted learning," or "academically gifted," and "classroom structure," "ability grouping," "heterogeneous grouping," or "homogeneous grouping" as the search criteria, resulted in over 500 hits. Narrowing the criteria to include "elementary" resulted in less than 200 hits. When limiting the search even further, by adding "socioeconomic status," "males," "females," or "gender" to the criteria, and confining the search to the last 10 years, less than 10 studies were provided. The limited availability of current research pertaining to gifted learning, gender, socioeconomic status, and classroom structure at the elementary level further supports the importance of this study. This research study looked specifically at classroom structure, whether homogeneous high academic ability or heterogeneous academic ability, and attempted to determine the extent, if any, the type of classroom structure had on the academic performance of gifted students in grade three, specifically looking at reading and mathematics performance on standardized tests.

With minimal consistency in state laws governing gifted education, there was a discrepancy in services provided advance learners (Webber, 2010). For this reason, it was important to first include the Federal as well as the Florida state definition of giftedness in this review of literature. Included in the definition sub-section was a list of common attributes that were often displayed by students who were defined as gifted (Board of Studies New South Wales). This was followed by a historical look of gifted education and an overview of the legislative actions taken in the United States that affected gifted education both directly and indirectly. Next, a review of the salient research pertaining to quantitative and qualitative gifted educational research followed. Because most non-experimental research executed in education was problematic when it came to isolating a single variable responsible for maximizing academic potential of advance learners, this review of research included gender differences among gifted students and the effects of socioeconomic status on gifted identification and learning as well as a variety of other pertinent gifted topics. This literature review concluded with a brief description of the types of gifted instructional strategies offered gifted learners in both a mixed academic ability classroom and a homogeneous high academic ability classroom.

Definition of Giftedness

With no universal definition of giftedness, there were many definitions that existed to describe the student who was gifted. The United States Federal Government provided the following definition:

> GIFTED AND TALENTED- The term gifted and talented', when used with respect to students, children, or youth, means students, children, or youth who give evidence of high achievement capability in areas such as intellectual, creative, artistic, or leadership capacity, or in specific academic fields, and who need services or activities not ordinarily provided by the school in order to fully develop those capabilities. (Title IX, Part A, Section 9101(22), p. 544)

Though each state had programs for gifted students, states and school districts were not required to use the definition supplied by the federal government, nor were states required to all have the same definition (Watson, Retrieved March 4, 2012).

The State of Florida Department of Education (2002) provided the following gifted student definition:

> (1) Gifted. One who has superior intellectual development and is capable of high performance.
>
> (2) Criteria for eligibility. A student is eligible for special instructional programs for the gifted if the student meets the criteria under paragraph (2)(a) or (b) of this rule.
>
> (a) The student demonstrates:
>
> 1. Need for a special program.
>
> 2. A majority of characteristics of gifted students according to a standard scale or checklist, and
>
> 3. Superior intellectual development as measured by an intelligence quotient of two (2) standard deviations or more above the mean on an individually administered standardized test of intelligence.
>
> (b) The student is a member of an under-represented group and meets the criteria specified in an approved school district plan for increasing the participation of under-represented groups in programs for gifted students.
>
> 1. For the purpose of this rule, under-represented groups are defined as groups:
>
> a. Who are limited English proficient, or

b. Who are from a low socio-economic status family.

2. The Department of Education is authorized to approve school district plans for increasing the participation of students from under-represented groups in special instructional programs for the gifted, provided these plans include the following:

a. A district goal to increase the percent of students from under-represented groups in programs for the gifted and the current status of the district in regard to that goal;

b. Screening and referral procedures which will be used to increase the number of these students referred for evaluation;

c. Criteria for determining eligibility based on the student's demonstrated ability or potential in specific areas of leadership, motivation, academic performance, and creativity;

d. Student evaluation procedures, including the identification of the measurement instruments to be used;

e. Instructional program modifications or adaptations to ensure successful and continued participation of students from under-represented groups in the existing instructional program for gifted students;

f. An evaluation design which addresses evaluation of progress toward the district's goal for increasing participation by students from under-represented groups.

(3) Procedures for student evaluation. The minimum evaluations for determining eligibility are the following:

(a) Need for a special instructional program,

(b) Characteristics of the gifted,

(c) Intellectual development, and

(d) May include those evaluation procedures specified in an approved district plan to increase the participation of students from under-represented groups in programs for the gifted.

(4) This rule shall take effect July 1, 1977 (Rule: 6A-6.03019, Special Instructional Programs for Students who are Gifted, ID# 1062070).

Although each student was unique, students who by definition were qualified as being gifted often shared common or typical attributes. The Board of Studies New South Wales (NSW) (2000) described the typical gifted learner's attributes as:

- a large, advanced vocabulary for their age;
- the ability to discuss complex ideas and concepts;
- quick mastery and recall of factual information;
- creativity and imagination;
- enjoyment of reading;
- the ability to work independently, to be self-critical, and to strive for perfection;
- an interest in and concern about world problems;
- the ability to apply learning and knowledge from one situation to another;
- the ability to grasp relationships and principles, and draw sound generalizations;
- initiation of their own activities and absorption in them, with little external motivation;
- wide interests, often in art, music and drama;
- the ability to relate well to older students/adults and enjoy learning from them; and
- the ability to use two or more languages. (p. 7)

History of Gifted Learning

In the early twentieth century one-room schools were prevalent throughout rural portions of the United States. These small town single-room schools were used by a single teacher who taught reading, writing, and arithmetic as well as the English language to students with varying ability levels. Teachers were charged with meeting the diverse educational needs of their student body. From six to sometimes over 40 students in first to eighth grade, the educator taught them all (Apps, 1996). Prior to this, there were however those who recognized students with exceptional cognitive abilities and thus provided accommodations for their learning.

In an excerpt from *Intellectual Talent* written by Harry Passow (1996), William T. Harris, the 1886 superintendent of the St. Louis public school system, was attributed with the implementation of the first large-scale acceleration program for academically capable students. Harris promoted students first on a semiannual, then on a quarterly, and finally on a five-week basis. Harris found the strength in the short term acceleration period to lie in its capacity to allow bright students to maintain a learning rate to which they were capable as well as inhibit pupils from acquiring lazy and careless habits (Passow, 1996). Following this program, other programs sprang up in New Jersey, Massachusetts, and California. A program called the Cambridge Double-Track Plan allowed capable students to, in six years, complete the first eight grades (Passow, 1996). Then in 1901, Worster, Massachusetts opened the first school geared toward educating and meeting the gifted children's special needs (NAGC, 2008).

Alfredo Benet Junior with the help of Theodore Simon, both French researchers, developed a series of tests in 1905 that were used to identify children of inferior intelligence. The original intent of the Binet-Simon test was to use the tests to identify children of inferior cognitive ability in order to separate them from normally functioning students and to provide them additional services (Binet & Simon, 1916; Plucker, 2003). If a student scored below average, then the student was to be provided special services to raise their cognitive ability to the norm (Frank, 2011). However, Binet had a concern that the tests could be misused so "he emphasized low scores did not indicate an inability to learn" (Frank, 2011, p. 2). In 1908, after working with Binet and Simon in France, Henry Goddard, carried the Binet-Simon intelligence scale back to America, translated it into English, and disseminated it to educators (NAGC, 2008). Goddard was a eugenicist who advocated for the use of the intelligence scale in public schools (Plucker, 2003). Then in 1916, Lewis Terman, a Stanford University professor, published in America, a revised Binet-Simon scale. His modified test, later known as the Stanford-Binet, was based on normal distribution of intelligence quotient (IQ) scores and would be used to sort students by grade and to make promotion decisions as well as determine school transfers (Minton, 1998). Curriculum tracks were used and ranged from vocational training for mentally retarded students to highly accelerated learning experiences for intellectually gifted students. Terman became known as the father of gifted education (NAGC, 2008). He advocated for the intellectually superior student to receive an education fitting one that matched their intellectual potential (Minton, 1998).

In New York City, in the 1920s, Leta Hollingworth, an educational psychologist who was best known for her work with children, offered special opportunity classes for gifted pupils, and was able to conduct research studies on the attending students (Plucker, 2003). This research laid the foundation for numerous research articles and, in 1926, for what some considered the first textbook on gifted education called *Gifted Child: Their Nature and Nurture* (NAGC, 2008).

In the mid 1900s intelligence was examined as a multidimensional concept (Guilford, 1950). Guilford, using his research done while serving in the U.S. Army Air Corps, posited that many mental abilities existed and that they were relatively independent. (Plucker, 2003). Guilford presented a classification system, Structure of Intellect (SI), which would show intelligence as being an incredibly complex three dimensional model.

> The SI model includes a Content dimension, Products dimension, and Operations dimension. It is represented as a cube with each of the three dimensions occupying one side. Each ability is defined by a conjunction of the three categories, occupying one cell in the three-dimensional figure. There are five categories of Content including visual, auditory, symbolic, semantic, and behavioral. Six categories exist in the Products dimension including units, classes, relations, systems, transformation, and implications. The five kinds of Operations include cognition, memory, divergent production, convergent production, and evaluation. (Plucker, 2003, http://www.indiana.edu/~intell/guilford.shtml)

An open system, the SI allowed for newly discovered areas of intelligence to be added on to any of the dimensions. "No longer was intelligence a monolithic global trait considered innate and absolute (Plucker, 2003, http://www.indiana.edu/~intell/ guilford.shtml).

In 1954, the National Association of Gifted Children (NAGC) was founded to increase national as well as international awareness of academic and social emotional needs of gifted and talented students, and to provide support for individuals involved in the education and welfare of these high ability children (NAGC, 2008). The NAGC represented an advocacy organization of parents and educators who were concerned with supporting professional educational development, research and research development as well as communication and collaboration with other agencies; all done in an effort to meet the educational needs of the gifted and talented, and to improve the quality of instruction for all students (NAGC, 2012). In that same decade, with the October, 1957 launching of Sputnik, Americans were made aware that schools were not adequately meeting the academic needs of all students, especially in the areas of mathematics and science (NAGC, 2008). The launching of Sputnik, the first artificial Earth satellite, by the Soviet Union coupled with the concern that America's educational system was not meeting our counties needs prompted the federal government to provide unprecedented amounts of funding for public education to reform education at all levels (Jolly, 2009). In an effort to counteract what seemed to be a superior Soviet educational system, the United States enacted the 1958 National Defense Education Act (P.L. 85-864). The majority of funding from this act was intended to promote the education of students who were academically capable of working as scientists, technologists, engineers, and mathematicians (STEM) (Jolly, 2009). It was not until two decades later that the Office of the Gifted and Talented received official status, and in 1974 was placed under the United States Office of Education (NAGC, 2008).

Several reports followed which provided Americans with a semblance of how America's youth were fairing in education compared to their global counterparts. In 1983, *A Nation at Risk* reported on the academic scores of America's most academically capable students. This report identified gifted students as being at risk and stated that the brightest children in America failed to meet the same high level of academic competiveness as their international peers (USDE, 1983). The report made claims that American students failed to compete academically with students from other countries, and called for a rise in America's educational academic standards as well as the promotion of appropriate curriculum for advanced learners. In addition, *A Nation at Risk* called for a national goal to develop the talents of every child to his or her fullest potential, and that the attainment of this goal should require that educators expect and assist all students to work to the limits of their capabilities (USDE, 1983).

Just ten years later, in 1993, The USDE published *National Excellence: The Case for Developing America's Talent*. This report, besides making recommendations based on decades of gifted educational research, outlined the educational neglect of America's brightest students (USDE, 1993). A third report, *A Nation Deceived: How Schools Hold Back America's Brightest Students*, was published in 2004 and was based on national research conducted on acceleration strategies. *A Nation Deceived: How Schools Hold Back America's Brightest Students* described the educational plight of America's brightest students and ultimately America:

> They're often the most frustrated students in the classroom. They're bored in kindergarten, and they're bored again in first grade. Year after year, they learn little that they haven't learned already. They hope things will get better, but things rarely do. For many of them, nothing changes. America's school system keeps bright students in line by forcing them to learn in a lock-step manner with their classmates. Teachers and principals disregard students' desires to learn more—much more—than they are being taught…. It's a national scandal. And the price may be the slow but steady erosion of American excellence. (Colangelo, Assouline, & Gross, 2004, p. 13)

Schools held back America's brightest students, while only offering them minimal amounts of academic enrichment in pull-out programs. For this reason, some parents and advocates for the gifted took their fight for better gifted education to the Nation's judicial system (Karnes & Marquardt, 1991).

Legislation Affecting Gifted Learners

Over the last century dramatic changes in education occurred, and many of these changes were prompted by federal legislation. While there were no formal federal mandates concerning special educational services for gifted learners, there were, however, many legislative actions that provided demonstration and research funds for gifted students (Karnes & Marquardt, 1991). The National Science Foundation Act (P.L. 81-597) enacted in 1950, provided federal funding for research and enhanced education in engineering, mathematics, and the physical sciences (NAGC, 2008). The National Science Foundation (NSF) was created using funding provided by the National Science Foundation Act. This agency consisted of twenty-five members appointed by the president of the United States and confirmed by the Senate. In addition to the establishment of NSF policy, the scientists, administrators, and engineers on the board of the NSF were responsible for advising the President and the Congress on policies related to their prospective fields (Cehelsky, 2002). One of the goals supported by the NSF was to provide the United States with "people–developing a diverse, internationally competitive, and globally engaged work force of scientists, engineers, and well-prepared citizens" (Cehelsky, 2002, p. 2).

In 1954, the case of Brown vs. The Board of Education of Topeka, (347 U.S. 483) found separate but equal education to be unconstitutional (NAGC, 2008). This historical court case ruled that school systems could no longer separate black and white children within public schools. Prior to this case, states had established laws that allowed segregated schools based on race, and Brown vs. The Board of Education made those laws unconstitutional (Meador, 2012). Justice Earl Warren, the chief justice in the 1954 court case presided over the unanimous decision which ended "separate but equal education" and set the stage for the civil rights movement (NAGC, 2008, p. 3; Meador, 2012).

In 1958, less than a year after the Soviets launched Sputnik, the United States Congress enacted the National Defense Education Act (P.L. 85-864) (NDEA). The NDEA was a four-year plan of action that provided an unprecedented amount of money for the United States educational system (Jolly, 2009). During this four-year period, under Title II-Loans to Students in Institutions of Higher Education, the United States government provided funds of over

$290,000,000 for scholarships, student loans, and fellowships (NDEA, 1958). Under Title III-Financial Assistance for Strengthening Science, Mathematics, and Modern Foreign Language Instruction, $300,000,000 was appropriated by the government (NDEA, 1958). Section 303 of Title III provided for the "expansion or improvement of supervisory or related services in public elementary and secondary schools in the fields of science, mathematics, and modern foreign languages" (NDEA, 1958, p. 1589). States that complied with the provisions of the NDEA received the funding provide by this act. The NDEA was an important piece of legislation because it was one of the first extensive efforts to improve gifted education by the United States federal government (NAGC, 2008).

The 1950s and 1960s saw parents of disabled children organized in an effort to pressure legislators into enacting laws that would provide their children with appropriate educational services. The Civil Rights Act (P.L. 88-352) that was enacted in 1964 focused on equal opportunities for all, which included educational opportunities. Public educational entities that received federal financial support from the USDE, under Title VI of the 1964 Civil Rights Act, by law, were no longer able to discriminate based on national origin, race, or color of skin.

> No person in the United States shall, on the ground of race, color, or national origin, be excluded from participation in, be denied the benefits of, or be subjected to discrimination under any program or activity receiving Federal financial assistance. (Civil Rights Act, 1964, p. 251)

Advocates for children with special needs continued their quest to secure appropriate educational services for the disabled and in 1975 the Education for All Handicapped Children Act (P.L. 94-142) (EAHCA) was enacted into law. This law had a dramatic effect on the learning that took place in the classroom because prior to this act only one out of five children with disabilities were provided education through the public school system; and therefore, more than one million children with disabilities were excluded from public education (USDE, 2000). On October 30, 1990, the EAHCA was renamed the Individuals with Disabilities Education Act (P.L. 101-476) (IDEA). The IDEA provided for the education of disabled children from birth to the age of 21 (Aleman, 1991). Since its enactment, there were a number of amendments to the IDEA; these amendments expanded the definition of disabled children, defined the purpose of IDEA, and stated the types of services that should be provided to children with disabilities (USDE, 2000). One of the major accomplishments of IDEA was to require school districts to educate children with disabilities in the least restrictive environment; which often meant that children with special needs could receive an education in the child's neighborhood school in a regular education classroom with non-disabled peers (USDE, 2000). As a result of these laws, all United States children had the right to a free, appropriate education in the least restrictive environment; and therefore, public schools expanded by adding resource rooms and self-contained classrooms.

In 1988, the Jacob Javits Gifted and Talented Students Education Act (P.L. 100-297) was enacted by the United States Congress. This act provided support in the development of talent in United States schools (USDE, 2012). As part of the Elementary and Secondary Education Act, the Jacob Javits Gifted and Talented Students Education Act was the only federal program dedicated solely to talented and gifted individuals (NAGC, 2008). While the Javits Act did not mandate for special services or fund local education programs for the gifted, it did provide for a federal program dedicated to students who qualified as gifted and talented (Karnes & Marquardt, 1991). The main purpose of the Jacob Javits Gifted and Talented Students Education Act was to bring about a concerted effort "of scientifically based research, demonstration projects, innovative strategies, and similar activities designed to build and enhance the ability of elementary and secondary schools to meet the special education needs of gifted and talented students" as well as reduce the gap in achievement between "students traditionally underrepresented in gifted and talented programs, particularly economically disadvantaged, limited English proficient (LEP), and disabled students" as well as other identified gifted students (NAGC, 2008, p. 1).

On January 8, 2002, the No Child Left Behind Act of 2001 (P.L, 107-110) (NCLB) was enacted into law as a reauthorization of the Elementary and Secondary Education Act (NAGC, 2008). Included in NCLB was the Jacob Javits Gifted and Talented Students Education Act; however, it was expanded to provide competitive state grants (NAGC, 2008). If school districts and state agencies implemented programs statewide that enhanced education for the gifted and the overall funding exceeded $7.5 million then the state grants were awarded (NAGC, 2008). Although one of the initial intentions of NCLB was to ensure that all students had a fair and equal opportunity to a high-quality education, the NCLB Act focused public educational funds and energies toward students only achieving a minimum educational proficiency in math and reading (Jolly, 2009). One of the major purposes of NCLB was to close the gap in achievement between high- and low-performing students (USDE, 2010). Through a trickledown effect of NCLB, the Federal Government held states accountable for student learning, who in turn held school districts accountable, who in turn held principals accountable, who in turn held individual teachers accountable (USDE, 2010). Each state in the United States was responsible for determining the state academic standards, setting the minimum proficiency levels, and approving the state assessment (USDE, 2010). In a letter to superintendents, dated February 5, 2004, Raymond Simon, the Assistant Secretary of Education, stated that "every State, including the District of Columbia and Puerto Rico have approved accountability plans that are yielding progress toward our national goal of every child reaching grade-level standards in reading/language arts and mathematics" (Simon, 2004). While the national goal of every child reaching grade-level standards was an important one, the wide spectrum of cognitive ability that existed in general education classrooms made it extremely difficult to meet the needs of the nation's brightest students (Tomlinson, 2002).

Gifted Student Research

According to the NAGC (2008), early research on gifted children were spurred on by the research done in the 1920s and 30s on mental inheritance and subnormal children as well as the development of instruments that could measure both subnormal and supernormal cognitive abilities. One of the earliest research studies was done in England, in approximately the year 1865, by Francis Galton (Hollingworth, 1926). Galton amassed and analyzed facts about individuals who had gained notable distinction in their lifetime. The purpose of the study was to determine the degree of eminence of the individuals studied, to determine the frequency of subjects in the various groups based on the degrees of intellect, and finally, to determine why some individuals became eminent while some did not (Hollignworth, 1926). The results of the study showed that the portion of men with the highest intellectual capability grew fewer the higher the level of intellect. In other words, the farther an individual diverged from medium ability, in either direction, the less frequently those like him occurred in society (Hollignworth, 1926). Gross (2000) classified the gifted as "mildly, moderately, highly, exceptionally, and profoundly gifted" (p.3). The information in Table 1, adapted from Gross (2000), was used to describe the prevalence of gifted at each IQ range. Galton determined that many of the characteristic traits displayed by the great men studied could be "approximately foretold from generation to generation" (Hollingsworth, 1926, p. 5).

Table 1

Prevalence of Giftedness

Description	Range of IQ	Prevalence in Population
Slightly Gifted	115-129	1:6 – 1:44
Averagely Gifted	130-144	1:44 – 1:1000
Highly Gifted	145-159	1:1000 – 1:10,000
Extremely Gifted	160-179	1:10,000 – 1:1,000,000
Profoundly Gifted	180+	Fewer than 1:1,000,000

A study similar to Galton's study was one done by Cox and Terman, both professors at Stanford University (Terman, 1954). They conducted research on childhood traits of gifted individuals. Using a two method approach, these researchers followed living gifted subjects, beginning from childhood, who displayed superior ability. The second approach consisted of tracing known mature geniuses back to childhood. Using 510 of "Cattell's objectively compiled list of the 1,000 most eminent men of history" the researchers gathered biographical information about the men that would "throw light on the early mental development of these subjects" (Terman, 1954, p. 224). The results of the study showed that the "genius who achieves highest eminence is one whom intelligence tests would have identified as gifted in childhood" (Terman, 1954, p. 225). The researchers also discovered that the exceptionally bright students who were kept in a learning environment with their same age, average intelligent peers found little to challenge their intelligence and all too often developed habits of laziness that later wrecked their college careers (Terman, 1954).

In the early 1900s, Terman would join a committee of men known as the Committee of the Psychological Examination of Recruits and in collaboration with this committee would design what was called Army Alpha and Army Beta for the United States Army (Plucker, 2003). In addition to Terman, other members of this prominent committee included Walter Bingham, Robert Yerkes, and Henry Goddard (Plucker, 2003). They met as a committee for the first time in May of 1917 and set out to construct for the Army two sets of tests: one battery of tests, known as Army Alpha, was used to determine a wide variety of cognitive abilities through the assessment of an individual's knowledge based on written and oral language; and the second one, known as Army Beta, was used to determine cognitive abilities of illiterate and Non-English Army recruits (Plucker, 2003). In 1917, with the United State's entry into World War I, Army Alpha and Beta were used to determine the intelligence of over one million Army recruits. The use of these tests and their publication in January of 1919 furthered the legitimatization of intelligence testing in education as well as with the general public (NAGC, 2008).

Also, in the 1920s, Leta Hollingworth and Margaret Cobb conducted a three year research study investigating the mathematics and reading academic ability of students with superior intelligence. Unlike most research that was done with students having superior intelligence compared to students with average to inferior intelligence, Hollingworth and Cobb's research compared the academic ability of children with 146 IQ with children having 165 IQ (Hollingworth & Cobb, 1928). Holding home and classroom structure equal, Hollingworth and Cobb discovered that children with 165 IQ outperformed children with 146 IQ, and that as the tasks increased in number and complexity the difference in achievement between the two groups increased in magnitude (Hollingworth & Cobb, 1928).

In 1970, a gifted and talented study began and was led by Sidney Marland, then United States Commissioner of Education. This study was initiated in response to a Congressional mandate (P.L. 91-230), and was comprised of five areas of research, which included a review of research, development of a major educational database, an interpretation of regional needs, program studies, and a review of an analysis of the delivery system of educational programs that benefit gifted and talented children (Marland, 1972). The outcome of the research provided the United States Congress with not only a definition for gifted and talented; but also, compelling major findings that talented and gifted students were being deprived. What follows are 13 major findings resulting from the five areas researched:

> — A conservative estimate of the gifted and talented population ranges between 1.5 million children out of a total elementary and secondary school population (1970 estimate) of 51.6 million.
>
> — Existing services to the gifted and talented do not reach large and significant subpopulations (e.g. minorities and disadvantaged) and serve only a very small percentage of the gifted and talented population generally.
>
> — Differentiated education for the gifted and talented is presently perceived as a very low priority at Federal, State, and most local levels of government and educational administration.
>
> — Although 21 States have legislation to provide resources to school districts for services to the gifted and talented, such legislation in many cases merely represents intent.
>
> — Even where there is a legal or administrative basis for provision so services, funding priorities, crisis concerns, and lack of personnel cause programs for the gifted to be miniscule or theoretical.

— There is an enormous individual and social cost when talent among the Nation's children and youth goes undiscovered and undeveloped. These students cannot ordinarily excel without assistance.

— Identification of the gifted is hampered not only by costs of appropriate testing—when these methods are known and adopted—but also by apathy and even hostility among teachers, administrators., guidance counselors and psychologists.

— Gifted and talented children are, in fact, deprived and can suffer psychological damage and permanent impairment of their abilities to function well which is equal to or greater than the similar deprivation suffered by any other population with special needs served by the Office of Education.

— Special services for the gifted (such as the disadvantaged) and talented will also serve other target populations singled out for attention and support.

— Services provided to gifted and talented children can and do produce significant and measurable outcomes.

— States and local communities look to the Federal Government for leadership in this area of education, with or without massive funding.

— The Federal role in delivery of services to the gifted and talented is presently all but nonexistent. (Marland, 1972, pp. xi-xii)

These findings were published August, 1971, in a document titled the Education of the Gifted and Talented Report to the Congress of the United States by the U.S. Commissioner of Education, which came to be known as the *Marland Report*. This report provided ample evidence that the USDE needed to take action to terminate the prevailing neglect of the Nation's brightest students (Marland, 1972).

The National Research Center on the Gifted and Talented (NRC/GT), which was established in 1990, conducted a national survey, *The Classroom Practice Survey,* to determine the extent to which gifted students received differentiated academic instruction in general education classrooms (Archambault, Westberg, Brown, Hallmark, Emmons, & Zhang, 1993). These researchers stated that the major finding from this study was that the surveyed educators of the third and fourth graders only made moderate modifications to the regular general education curriculum to meet the academic needs of their gifted students (Archambault, et al., 1993). This study was replicated ten years later, and surprisingly, even though teachers had more professional development in gifted education than the educators from the previous study their differentiation practices in classrooms had not changed (Westberg & Daoust, 2002).

Rogers (1991) conducted a meta-analysis in which he reviewed 314 studies looking specifically at forms of acceleration and the positive effects that acceleration had on gifted students. Within a 76 year period from 1912 to 1988, only 81 of the 314 studies provided Rogers with enough data for calculating the effect size. Rogers ranked and ordered the 81 studies based on the sample size and the strength of the study design. Rogers examined the following 12 types of acceleration: early admission to college, non-graded classrooms, curriculum compaction, grade telescoping, grade skipping, concurrent enrollment, early entrance to school, subject acceleration, mentorship, advance placement, credit by examination, and combined accelerative options. Each study's outcome was classified as academic, psychological or socialization outcome, and for those studies that had a combination of outcomes they were averaged together. Mean effect sizes for each outcome was calculated and the results from Rogers' study showed that every type of acceleration except concurrent enrollment, advanced placement, and grade skipping showed a significant academic effect, meaning that the effect size was greater than .30. Two types of acceleration showed significant socialization effect: mentorship and grade skipping. Also, only two types of acceleration had a significant psychological effect size:

mentorship and combined accelerative options. Based on Rogers' conclusions from her research syntheses, she provided the following 5 guidelines for educators using grouping options for advanced learners:

1. Students who are academically or intellectually gifted and talented should spend the majority of their school day with others of similar abilities and interests.

2. The cluster grouping of a small number of students, either intellectually gifted or gifted in a similar academic domain, within an otherwise heterogeneously grouped classroom can be considered when schools cannot support a full-time gifted program (either demographically, economically, or philosophically).

3. In the absence of full-time gifted program enrollment, gifted and talented student might be offered specific group instruction across grade levels, according to their individual knowledge acquisition in school subjects, either in conjunction with cluster grouping or in its stead.

4. Students who are gifted and talented should be given experiences involving a variety of appropriate acceleration-based options, which may be offered to gifted students as group or on an individual basis.

5. Students who are gifted and talented should be given experiences which involve various forms of enrichment that extend the regular school curriculum, leading to the more complete development of concepts, principles, and generalizations.

6. Mixed-ability cooperative learning should be used sparingly for students who are gifted and talented, perhaps only for social skills development programs. (1991, p. xiii)

Rogers questioned why, even though results of studies established quantitative effects, ability grouping remained a relatively unused educational practice. She cited researchers who "argued that the use of ability grouping for reducing the demands upon teachers and improving the academic achievement of learners [was] not sufficient reason for maintaining the practice" (Rogers, 1991, p. 1).

According to another study, conducted by Wright, Horn, and Sanders (1997), teacher effect was the dominating factor affecting student learning gains, and while classroom context variables were not as influential on academic growth they did however play a significant role in the gifted learner's ability to make the same level of academic learning gains as the lower to average performing students. The researchers noted that the gifted learners made less learning gains than did the average to below-average ability learners, which they posited the following possible explanations for this disparity: lack of opportunity to proceed at an accelerated pace, lack of accelerated courses offered, insufficient challenging materials and resources, and a concentration of instructional delivery and facilitation geared toward average to below-average academic ability students in the heterogeneous classroom (Wright, et.al., 1997).

The purpose of Taylor's (2007) causal-comparative study was to determine if academic ability grouping improved gifted and academically advance students' performance on the reading and mathematics Tennessee Comprehensive State Assessment. Two hundred thirty-five academically advanced and gifted learners attending two rural elementary schools were the participants. One school, with 112 of the participants, employed ability grouping, and the other school, with 123 participants, used mixed ability grouping. Taylor used t-tests and ANOVAs to analyze the participants' state assessment results and to determine whether there was a significant difference in mean scores. The researcher found that a statistically significant difference in the reading and mathematics state assessment scores occurred for advanced and gifted learners between students who were ability grouped and those who learned in a mixed ability group. The research results showed an academic benefit for gifted and advance learners who were ability grouped (Taylor, 2007).

Palladino (2008) carried out a single subject intrinsic case study that was designed to gain a better understanding of teachers' instructional practices for gifted students. Using this case study the author was able to make available successful techniques and strategies that educators could use in support of their gifted learners in a traditional heterogeneous academic ability classroom. Using a survey, the researcher asked participants how to identify gifted students, what types of differentiated challenges they faced, how they modified their normal classroom structure in order to meet their gifted students' instructional needs, and how they established a balance between the diversity of cognitive ability among their students. Using the gathered data from the survey, Palladino made recommendations for teachers and educational leaders:

> — provide challenging activities for gifted students as well as opportunities for gifted learners to work individually and together,
>
> — examine more comprehensive ways to identify gifted learners, and in doing so heighten the awareness regarding the definition of giftedness,
>
> — use multiple sources to identify gifted students over multiple periods of time,
>
> — make resources on best instructional practices for gifted students available for all teachers,
>
> — provide time for collaboration among teachers to plan and research appropriate differentiated lessons, and
>
> — allow program access to students who may not qualify under district standards, but who show an extreme interest. (Palladino, 2008, p. 83)

Academic Gender Differences

According to Olszewski-Kubilius and Turner, research carried out in the 1970s showed an understandably consistent view of gender differences (2002). Following the gender-stereotypic socialization patterns of the time, girls were favored on verbal achievement tests and boys on mathematics achievement tests. Because of these types of findings, a concerted effort was made to increase the number of girls studying mathematics as well as increase girls' achievement levels (Olszewski-Kubilius & Turner, 2002). Macoby offered this explanation for the prevailing academic differences, "Members of each sex are encouraged in, and become interested in and proficient at, the kinds of tasks that are most relevant to the roles they fill currently or are expected to fill in the future" (1966, p. 40).

Gallagher conducted a regression analysis to determine the comparative importance of a list of variables in an effort to predict SAT-Mathematics (SAT-M) scores for both gifted females and males (1989). Learning style, spatial ability, cognitive reasoning ability, and visual spatial ability were among some of the variables considered. Visual spatial ability scores were based on speed of response to the tasks. Results showed that gifted males had a greater propensity for process skills, and that they significantly outperformed gifted females. Gallagher posed that the SAT-M scores for females and males were predicted by different variables. He posited that the reason why gifted boys outperformed gifted girls on the visual spatial portion of the SAT-M was that males performed quicker on these types of tests, which gave the gifted males an advantage because the SAT-M test was a timed test. "If females do not perform as quickly as males, they will not obtain scores as high on the SAT-M – which of course is a timed test - and they almost certainly will not break the magic 700 score which is perceived as so important in identifying mathematics ability" (Gallagher, 1998, p. 199).

A study conducted by Olszewski-Kubilius and Turner (2002) examined the patterns of differences on standardized tests among elementary school aged gifted girls and gifted boys. This study's results showed males outperformed females on mathematics achievement tests beginning as young as third grade; however, this difference was only significant among 6th and 5th graders (Olszewski-Kubilius & Turner, 2002). While both genders had a preference for mathematics, most gifted girls participating in the study attributed their academic strengths to be verbal in nature, while the majority of gifted boys perceived their strengths to be science and mathematics. Perceptions of academic strengths corresponded to students' real performance on the assessment. In addition, the abilities tested in the assessment corresponded to students' preference of easiest to most challenging subject (Olszewski-Kubilius & Turner, 2002).

Assouline, Colangelo, Ihrig, and Forstadt (2006) conducted a study that focused on the attribution opinions of gifted boys and girls, pertaining to gifted students' views about academic success and failure. These researchers found that gifted learners were more likely to believe that failure stemmed from not working hard enough, designated by the researchers as long-term effort, rather than not being smart enough, which the researchers designated as ability (Assouline, et al., 2006). In addition, they discovered that gender differences were prevalent in success and failure attribution choices for language arts and mathematics. Gifted girls and boys who participated in this study did not perceive their success or failure in the same way. A higher percentage of boys indicated that "I am smart" was the attributional choice for why they were successful in mathematics, whereas a larger percentage of girls than boys chose "I work hard" for the reason for their academic success in math (Assouline, et al., 2006). Beliefs about academic ability were found to be connected to student motivation, and as the researchers posited "teachers who understand some of these motivational issues will be more effective in helping gifted students achieve success" (Assouline, et al., 2006, p. 283).

Socioeconomic Status and the Gifted

Family income has been shown to be one of the greatest correlates in respects to academic achievement (Rogers, 1996). According to the USDE, there were greater obstacles that hindered the education of children who lived in poverty then those who did not (1993). These financially disadvantaged children had more psychological difficulties and increased health problems as well as fewer resources. VanTassel-Baska, Olszewski-Kubilius, and Kulieke (1994) completed a study in which they found that the disadvantaged students sampled in their study showed significantly lower perceived self competence for both social and academic then did their more advantaged peers. Of the 71 female and 76 male gifted students who participated in this study, 50 of them were classified as low socioeconomic status (SES). The results showed that these lower SES gifted students found parents, classmates, teachers, and friends to be less supportive then did the higher SES gifted students (VanTassel-Baska, et al., 1994).

In a study done a few years later, Stormont, Stebbins, and Holliday (2001) found that students who lived in poverty or had a low SES were among the most underrepresented participating in the gifted and talented programs in schools. Carman and Taylor concerned with the limited published research that examined the relationships between SES and Naglieri Nonverbal Ability Test (NNAT) conducted a correlation and multiple regression analysis to determine if the NNAT identified low SES students at a comparable rate to students with an average to high SES (2010). The NNAT was a nonverbal assessment that was administered to students in order to identify students eligible for the gifted and talented programs. The results of this study showed that the low SES kindergarten students who participated in the research were only half as likely to be identified as the other children (Carmon & Taylor, 2010).

Herbert (2002), who examined three case studies of gifted students with low socioeconomic backgrounds, found that the educators of these students were sensitive to the difficulties that were manifested in the students' communities and home environments. He stated that educators often did not "accept the notion that with the existing difficulties in their students' lives, they still [had] a responsibility to acquire an education," and that teachers had "a responsibility to maintain high expectations for them" (Herbert, 2002, p. 135). Based on his research, Herbert recognized that students from low socioeconomic backgrounds needed enriched learning experiences provided in school because their families could not afford extra-curricular activities for their children.

Gifted Instructional Environments

In 2010, Butterworth conducted a sequential mixed methods study in order to better understand the experiences and attitudes of general education teachers who taught in heterogeneous academic ability classrooms. Butterworth's study focused on teacher preparation as it pertained to implementing new research-based strategies for gifted students. Through surveys, interviews, and observations, he investigated the relationships linking teachers' experiences, classroom practices and strategies, professional development, and NCLB mandates within the context of the mixed academic ability classroom structure. He randomly selected 23 middle school teachers to participate in the study, and he used a sample t-test to assess the patterns of their responses. A Chi-squared was used to analyze relationship between the patterns. The results of the study showed trends of positive social change, and also reveled that over 78% of the participants were not gifted endorsed and were not sufficiently trained in the strategies that would benefit gifted learners in a mixed-ability classroom (Butterworth, 2010).

Another research study, also completed in 2010, was done by Webber. Instead of analyzing teachers' responses, this researcher analyzed students' responses in an effort to gain an understanding of the experiences and educational needs of gifted young adults as well as uncover trends in gifted education. The purpose of this phenomenological study was to determine the best supportive and educational strategies used for gifted learners. Participants consisted of two different groups, one with 21 young adults who had previously been identified as gifted, and the other, a group of 20 educators who had previously worked with gifted students. Like the Butterworth study previously listed, this study's researcher used surveys, interviews, and observations to gather data. The results of Webber's study showed that there was no absolute definition of a gifted student that existed, and even if an individual did not meet the definition to qualify as gifted they still could need as much support as one who was identified as gifted. In addition to this, the school district being studied was found to be implementing programs that motivated advance learners, and that differentiated instruction was an effective strategy used to address the gaps in student achievement (Webber, 2010).

In her study, Riska (2010) found that the classroom structure was the avenue through which challenging high interest materials, in-depth studies, and advanced cognitive activities could be provided. She wrote that if gifted students were to maintain their advance cognitive capabilities academic curricula must be consistently challenging, and that "gifted minds expand with activities that require problem solving analyses" (Riska, 2010, p. 10). These sophisticated educational opportunities described the instructional characteristics present in a fully self-contained high academic ability classroom structure; this type of learning environment maximized the potential for learning as well as provided the impetus for learning enjoyment (Burney, 2008).

Apps (2011) conducted a mixed methods study using a purposeful random selection of 15 teachers. These participants completed an on-line survey and an in-depth semi-structured phone interview. Reported in frequencies and percents, the results from this study's descriptive statistical analysis revealed that the educators who participated in the study perceived that gifted education held low priority and fiscal status at the schools and district level, and that despite the first finding, participants still continued their resolve to differentiate instruction for their gifted learners (Apps, 2011).

Cross (2011) wrote about a study that was conducted in 2007 by Al-Lawati, Frazier, and herself. These researchers requested that supporters of gifted education complete a questionnaire. The questionnaire, which was filled out by more than 340 supporters, yielded results showing that among supporters there exist dichotomous views about gifted education. While most supporters agreed that the purpose of gifted education was to maximize students' academic potential, there was, however, a division on how the gifted education should be delivered. Two types of supporters were described by Cross, the Individualists and the Communitarians. The study she described showed that 70% of the Individualist believed that self-contained or homogenous high academic ability classes were best for gifted students, whereas only 12% of the Communitarians believed that self-contained classes were best. In contrast, only 8% of the Individualists selected heterogeneous or mixed ability classroom structures with the majority of Communitarians choosing this option.

Learning Options for Gifted Students

Controversy often arose because gifted education was not implemented consistently across the United States. Each state was tasked with providing the funds for gifted education, with determining the extent to which gifted students received gifted services, and with determining the identification criteria for gifted qualification. In addition to these controversial topics, a strongly debated topic was what form of gifted education was the most appropriate for the gifted learner. Many who researched and wrote about gifted education agreed that gifted students required special educational experiences that challenged their advanced cognitive abilities (Rogers 1991; Stainback & Stainback, 1996; Renzulli & Reis, 1997; Melser, 1999; Gardner, 2000; Gross, 2000; Tomlinson, 2002; Shields 2002; Westberg & Daoust, 2002; Adams & Pierce, 2004; Robinson, 1981). However, where they disagreed was how the instruction that challenged students' advanced cognitive abilities should be implemented. Some believed that a mixed-ability or heterogeneous ability general education classroom was the best educational environment for these high-ability students (Melser, 1999; Renzulli & Reis, 1997). In this setting, a general education teacher, based on the knowledge of his or her students' high academic abilities, encouraged students through high expectations. Some educators provided differentiated instruction; yet most, provided students with limited to no modifications in instruction (Westberg & Daoust, 2002; Tomlinson, 2002). Kulik (1991) described this type of learning environment as "simple programs" in which all ability groups were taught using the same or similar materials and by the same or similar instructional delivery (p. 67).

Another school of thought believed that gifted children needed to receive full-time educational services outside the regular classroom (Gross, 2000; Rogers, 1991; Shields, 2002).

Allan (1991) found that the strongest positive academic learning took place when grouping gifted students based on accelerated classes or classes with specially trained teachers who differentiated curriculum and instructional methods designed for gifted students. In 2000, Gross wrote, “The regular classroom is not necessarily the least restrictive environment for the intellectually gifted, and for exceptionally and profoundly gifted students it is probably the most restrictive environment” (p. 5).

The type of educational services offered the gifted learner, not only varied from state to state, but also from school to school within each state. No two school districts provided their advanced learners gifted services in the same way. This was due to the varying factors that affected the implementation of the services such as availability of resources, population demographics, content-area focus, ages of students served, professional development and experience level of the teacher, gifted learners abilities and interest, and the learning community’s attitudes and beliefs about giftedness (Clarenbach, 2007). Advocates for the gifted agreed that the type of instructional model offered gifted students should match the identified needs of the learner (VanTassel-Baska, 1986; Clarenbach, 2007; Tomlinson, 2001; Adams & Pierce, 2004; Robinson, 1981; Gross, 2000; Rogers 1991; Stainback & Stainback, 1996). However, according to VanTassel-Baska, educators incorporated a medley of approaches into their instruction without adequately testing in a research context for the effectiveness of the instructional models being used, and this showed an inconsideration for their overall value in the educational context (1986). Two types of classroom structures used in an effort to meet the academic needs of the gifted learner were the heterogeneous grouping of mixed academic ability students and the homogeneous grouping of high academic ability students.

Heterogeneous Academic Ability

Heterogeneous grouping of students was a traditional practice dating back to the earliest schools (Apps, 1996). This practice involved grouping students into a single learning environment without regards for their cognitive abilities or their preparedness; often randomly grouping students using birth date as the only criteria. In the 1970s, with the enactment of the EAHCA, the shift toward inclusion made it possible for all children, regardless of their diverse learning needs and or disabilities, to receive educational services from a general education teacher in a regular education classroom (Stainback & Stainback, 1996). Stainback acknowledged that the intent was for general education teachers and special educators to work together in a unified, consistent effort, using the necessary resources to meet the educational needs of the students (1996). Optimally, general education teachers were to have the needed training and resources as well as specialized staff continuously available to them and their students in order to meet their students' academic and social emotional needs within their classroom. Thus, general education teachers were challenged with responding to a broader range of learning needs and were expected to provide effective instruction to each and every one of their students (Adams & Pierce, 2004). However, the lack of funding for resources, additional specialized staff, and staff development often left general education teachers responsible for meeting the academic needs of their diverse student population, and unfortunately, "even when there [were] evidence-based practices, practitioners, for various reasons, [didn't] always end up using them" (National Council on Disability, 2004, p. 8). Despite widely publicized alternative curriculum models that were developed for special needs populations, which included the gifted population, most gifted students were typically educated using the whole group traditional instructional methods in a regular classroom with educators that had not been trained to facilitate learning for high-ability students (Clarenbach, 2007). Clarenbach indicated that the reason highly-advanced students continued to be instructed in this fashion was due to the belief that gifted students would experience academic success regardless if they were exposed to the instructional strategies designed to meet their gifted needs. The fallacy of this belief became apparent when in 1983 gifted students, in a national report, were identified as being at risk (USDE, 1983). This national report called *A Nation at Risk* stated that the brightest children in America failed to meet the same high level of academic competiveness as their international peers (USDE, 1983). Yet, even after this report was published, there were those who still felt strongly about educating gifted students in a regular classroom. Thomas Skritc, a professor of special education and author of The Special *Education Paradox: Equity as the Way to Excellence*, felt strongly against ability grouping, and instead promoted a heterogeneous academic ability learning environment because he felt that in the mixed-ability classroom young people had the benefit of being able to collaborate with and learn from other students (1991).

> Moreover, educational equity is a precondition for excellence in the post-industrial era, for collaboration means learning collaboratively with and from persons with varying interests, abilities, skills, and cultural perspectives, and taking responsibility for learning means taking responsibility for one's own learning and that of others. Ability grouping and tracking have no place in such a system… (Skritc, 1991, p. 181)

Skritc was not the only one with this view on education, and as this heterogeneous attitude gained momentum, a movement toward inclusion took hold, and teachers found themselves responsible for facilitating the learning to a broader range of academic abilities (Adams & Pierce, 2004).

Differentiated Instruction

Differentiated instruction was promoted as one solution for general education teachers to use in order to provide appropriate instruction for their diverse classroom populations. Wallace (2009) summarized the effects of inclusion on instruction when he wrote, "as schools increasingly emphasize heterogeneity and greater academic and cultural diversity in classrooms, the challenge to provide differentiated education to a wider variety of learners escalates" (p. 318).

However, as was previously mentioned, the 1972, *Marland Report* revealed that differentiated education for advance learners was a "very low priority at Federal, State, and most local levels of government and educational administration" (p. 7). In an effort to define differentiated instruction, the *Marland Report* established the following three characteristics for differentiated education for the gifted and talented:

1. A differentiated curriculum which denotes higher cognitive concepts and processes.

2. Instructional strategies which accommodate the learning styles of the gifted and talented and curriculum content.

3. Special grouping arrangements which include a variety of administrative procedures appropriated to particular children, i.e., special classes, honor classes, seminars, resource rooms, and the like. (Marland, 1971, p. x)

Unfortunately, nearly 20 years later, researchers Archambault, Westberg, Brown, Hallmark, Emmons, and Zhang found that educators only made moderate modifications to the regular general education curriculum to meet the academic needs of their gifted students (Archambault, et al., 1993), and even ten years later, after educators attended professional development in gifted education, researchers Westberg and Daoust found that educators still only provide moderate modifications to the regular general education curriculum (Westberg & Daoust, 2002).

Homogeneous High Academic Ability

In the homogeneous high academic ability classroom structure, instead of using age based placement as the only criteria for grouping students, students were grouped based on interest, academic preparedness and/or specific ability. Stainback and Stainback (1996) wrote that when learning was interesting to students, and it allowed students to see the purpose and function behind acquiring knowledge and skills then this helped to establish a classroom that supported academic learning. In VanTassel-Baska's (1986) article *Effective Curriculum and Instructional Models for Talented Students*, she presented the evolution of instructional models that were shown to be effective for gifted learners. These teaching and learning models were used in high academic ability classroom structures and included, but were not limited to, the following curriculum models: project-oriented, convergent and divergent thinking activities, curriculum planners, gifted curriculum workbooks, topic of interest approach, creative problem-solving, and even a confluent approach that included both enrichment and acceleration strategies (VanTassel-Baska, 1986). Furthermore, advanced learners who exhibited a rich memory were less likely to need repetition for mastery, and they often displayed the ability to give elaborate and detailed responses to questions (Board of Studies NSW, 2000). According to Tomlinson (2001), gifted learners needed help to develop their abilities. This help came in the form of teachers that coached for growth and used the appropriate challenging curriculum (Tomlinson, 2001). Tomlinson named the following hindrances to gifted students not meeting their fullest academic potential: advance students who were mentally lazy, who were perfectionists, who failed to develop a sense of self-efficacy, who failed to develop adequate coping and study skills, and who became trapped in the belief that grades were more important than ideas and taking intellectual risks (2001). Educators used several strategies to combat these deterrents to learning for gifted students. In 2003, The Bureau of Instructional Support and Community Services prepared a Brief that described enrichment and acceleration as the two categories that the strategies employed for advanced learners fell into.

Acceleration

Acceleration of gifted learners referred to a practice of presenting curriculum content at a quicker pace or earlier age (Bureau of Instructional Support & Community Services, 2003). Used as an educational intervention for advanced learners, acceleration was supported by robust and consistent research (NAGC, 2009). In their *Guidelines for an Academic Acceleration Policy*, 2009, the NAGC described two types of acceleration, content-based and grade-based acceleration. Some educators were reluctant to use acceleration as an intervention for fear of a negative effect on the accelerated student's social-emotional development; however, the NAGC stated that there was no evidence that acceleration had a negative effect on the social-emotional development of students (NAGC, 2009). The Board of Studies NSW (2000), however, recommended that students' social and emotional readiness be evaluated before students were considered for acceleration. In a background paper titled *Acceleration for Gifted Students* prepared April 19, 1996, for the Portland Public School District's Talented and Gifted Advisory Committee, DeLacy cited Jennifer Jasaitis (1994) for the following list of the many different ways to achieve acceleration:

- early entry to school;
- grade skipping;
- ungraded classrooms where students of varying ages are grouped together and the curriculum is based on individual mastery rates rather than the age of the student;
- curriculum compacting, which involves skipping material that the student has already mastered;
- grade telescoping which involves completing a program that usually requires a fixed number of years to finish in less than the usual time;
- concurrent enrollment, enabling a child to attend more than one school at a time;
- subject acceleration, which involves offering the student an advanced curriculum in a single subject;
- advanced placement classes;
- classes taught at an accelerated rate or at a higher level of difficulty which enable a student to gain credit for completing curriculum usually taught in subsequent years;
- mentorship, individual instruction at an advanced level in a single subject offered by an expert in that subject;
- credit by examination; and
- early admission to college. (Jasaitis, 1994, pp. 6-7)

Some of these options for acceleration involved "ability grouping: children who have gained a similar mastery level must be grouped together to take advanced placement or accelerated classes" (DeLacy, 1996, p.2).

<u>Enrichment</u>

While enrichment was often used in high-ability grouping, it differed from acceleration in that it referred to curriculum content presented with more depth, abstractness, and/or complexity than was evident in the general curriculum (Bureau of Instructional Support & Community Services, 2003). Like differentiated instruction, enrichment was suitable for all students and had been employed in both heterogeneous academic ability and homogeneous advanced academic ability classroom structures (Allan, 1991). However, in the homogeneous classroom structure more time was available for enrichment and the range of differentiated instruction was less because the educator in the heterogeneous classroom structure was tasked with accommodating for the vast differences in academic ability that existed within the heterogeneous classroom. According to Rogers (1991), research consistently supported substantial academic effects for enrichment for most types of ability grouping, "especially when enrichment [was] part of a within class ability grouping practice" (p. xi). Enrichment was used to fill the time of students who learned "more quickly by offering materials or activities that do not allow faster progress through the established curriculum" (DeLacy, 1996, p. 2). Instead of introducing gifted students to advanced curriculum, educators had gifted students work through the general education curriculum, and utilizing enrichment, gave gifted students "other fields or activities, such as art, music, journal writing, clubs or field trips…assigning additional work at the same level or difficulty, or assigning the advanced student various school responsibilities such as classroom aide…more complex word problems… or twice as many problems as other children…" (DeLacy, 1996, p. 2).

Summary

Stainback and Stainback (1996) posed this question "What should the organization of a school look like to maximize learning benefits for each of the student members?" (p. 1). For almost a century, educators have pondered whether intellectual capacity be a determinate in the classroom structure assigned to students. Traditionally, Americas' public educational system lumped students of the same age, regardless of academic ability, in a heterogeneous academic ability classroom structure. According to Watson (2012), students who were typically identified as being gifted had the potential to achieve beyond the expected academic level of their same-age peers; however, their potential did not mean that they performed at the higher level. Examination of gifted research and the history of gifted legislation as well as the educational practices employed for gifted students did not yield an absolute solution for providing gifted learners with an educational experience that maximized their learning potential. It had been problematic for researchers to isolate a single variable responsible for maximizing academic potential of advance learners. For this reason, there was strong debate on whether or not students should learn in a homogeneous high academic ability classroom structures or in a heterogeneous academic ability classroom structure. Research supported both types of classroom structure. The majority of research, however, pointed to the homogeneous high academic ability classroom structure as providing the most academic benefit for gifted learners. In contrast, advocates for both the physically and intellectually disabled urged that special needs students be place in the general education classroom, suggesting that this environment presented itself as the least restrictive environment (Gross, 2005). However, as Gross pointed out "the regular classroom is not necessarily the least restrictive environment for the intellectually gifted, and for exceptionally and profoundly gifted students it is probably the most restrictive environment" (2005, p. 8).

Despite the plethora of research that suggested high-ability learners, ahead of their age peers, needed special accommodations to maximized academic success, gifted learners were not having their unique academic, social, and cognitive needs met in the regular classroom (NAGC, 2009). Renzulli, who in 2005, was the director of the National Research Center on the Gifted and Talented, referred to the neglect of America's most gifted young as the "quiet crisis" (Renzulli, 2005, p. 33). He cited the cause of the educational neglect of the Nation's brightest as a trend by America's educational system to make massive investments toward improving the basic skills of struggling learners. Renzulli stated that the "$350 billion annual investment in public education, however, has shifted quite dramatically, to the detriment of in-depth curricula at the highest levels in areas such as the sciences and social studies, as well as coursework that promotes physical well-being and creative and artistic development, areas now considered peripheral parts of the curriculum" (2005, p. 33). This shift from in-depth curricula to curriculum targeted at closing the achievement gap between academically struggling students and high academic ability learners deprived gifted learners and prompted the need for gifted educational services.

While Chapter 2 of this research study examined the historical varying of opinions and research results concerning learning options for gifted students, the research that was conducted in this study specifically examined the implications that classroom structure, whether homogeneous high academic ability or heterogeneous academic ability, had on the reading and mathematics academic performance of gifted third graders. In Brevard Public Schools, the majority of gifted third grade students were assigned to a heterogeneous academic ability classroom structure. According to the Florida Department of Education (FDOE) Brevard Public School District had 5,365 third graders enrolled in 2010, and 79% of them achieved at a level of proficiency or above in Reading and 81% in Mathematics. However, only 10% achieved the highest level attainable in Reading and 16% in Mathematics (FDOE, 2010). This study investigated the implications that classroom structure had on academic achievement, and the results of this research rendered supplemental information for establishing the learning environments assigned to high-ability learners.

CHAPTER 3
METHODOLOGY

The purpose of this study was to determine the difference, if any, the type of classroom structure had on third grade gifted students' reading and mathematics performance on standardized tests as well as examine the extent to which third grade gifted students' reading and mathematics performance could be predicted based on classroom structure, student gender, and students' socioeconomic status. This chapter provides an explanation of the research design, the population and sample descriptions, and the procedures that were used to conduct this research study. In addition, the instrumentation used to gather the data and the general data analysis pertaining to each of the research questions and hypotheses was included. Chapter 3 concluded with the summary of this study's methodology.

Research Design

The researcher utilized an ex-post facto, quasi-experimental design to conduct the study. The participants were not randomly assigned to a learning environment and the information used in the study came from archived data provided by the Brevard County Public School District.

Population

The population that was used in this research study consisted of the approximately 925 gifted third grade students who attended public elementary schools in the targeted school district in either the 2010-2011 school year or the 2011-2012 school year. This population did not include gifted students attending public elementary charter schools or students attending virtual schools.

Sample

All the third grade gifted students taught in a homogeneous high academic ability classroom structure were part of the sample used in this study because the number of students, who were taught in a homogeneous high academic classroom structure was less than 100 students (32 students during the 2010-2011 school year, and 32 students during the 2011-2012 school year). The same number of third grade gifted students who were taught in a heterogeneous academic ability classroom structure was randomly selected from the remaining third grade gifted population using SPSS's random generator.

Methods of Data Collection

Data gathered involved retrieving third grade gifted student quantitative data from the Brevard County Public School District's student database. This information was extracted from the database for both the 2010-2011 and the 2011-2012 school years. The data were secondary data and included students' DSS from their FCAT 2.0 Reading and Mathematics assessments. In addition, the students' teachers were retrieved and tracked by a de-identifying number. The homogenous high academic ability classroom structure was determined based on the condition that the teacher number was connected to nine or more gifted students. The maximum number of third grade students assigned to one teacher in the Florida public school system was 18 students. Therefore, nine students represented at least half of the student population in any third grade classroom in Florida public schools. If at least half the students in the classroom were gifted then the classroom structure for a student was designated as a homogenous high academic ability classroom structure. The following additional data about each student were retrieved from the targeted school district's student database: gender, number of gifted students in the class, and free and reduced lunch status. This information was use to examine the extent to which third grade gifted students' academic performance could be predicted based on the listed variables.

The original data requested from Brevard County Public School District included, for both the 2010-2011 and the 2011-2012 school years, the following 3rd grade gifted data: students' identification number, students' teacher (tracked by teacher number), students' gender, school the students attended (tracked by school number), students' free and reduced lunch status, and students' FCAT 2.0 Reading and Mathematics DSS (dependent variable). Consent for this study was obtained from the University of Central Florida Institutional Review Board (see Appendix A for the IRB Review) and the Brevard County Public School District (see Appendix B for the District Approval Letter).

Once the data were retrieved they were stored in a Microsoft Excel spreadsheet. In order to protect students' identity and ensure confidentiality, before saving the information to an Excel spreadsheet, the students' authentic district identification number was replaced with a unique number that was not traceable back to the student. Student data were transferred from the Excel spreadsheet to SPSS to run the statistical analysis.

Instrumentation

The instrument used in this research to track the academic performance of the participants was the FCAT 2.0. Information about administration, scoring, and reporting procedures for the FCAT 2.0 was provided by the FDOE – Office of Assessment (2012). The reliability and validity of the FCAT 2.0 was addressed in a Florida Statewide Assessments 2011 Technical Report presented by the FDOE (2012). According to this manual, "validity arguments based on rationale and logic are strongly supported for the FCAT 2.0 and ... the empirical validity evidence for the scoring and the generalization validity arguments for these assessments are also quite strong" (FDOE, 2012, p. 97). Furthermore, "reliability indices, model fit, and dimensionality studies" provided consistent results, which indicated that the FCAT 2.0 was scored properly and that these "scores can be generalized to the universe score" (FDOE, 2012, p. 97).

The Reading FCAT 2.0

The FCAT 2.0 Reading tests were criterion-referenced assessments that were given annually to students enrolled in third through tenth grade. These assessments measured student achievement based on the Next Generation Sunshine State Standards (NGSSS) for reading. The third grade FCAT 2.0 Reading test was administered in two 70-minute sessions, and consisted only of multiple-choice items. The test was designed to assess students' academic mastery of vocabulary, reading application, literary analysis of fiction and nonfiction reading materials, and informational text and research processes (FDOE - Office of Assessment, 2012). The 2011 FCAT 2.0 Reading DSS ranged from 86 to 3008. For third grade, however, the highest developmental level tested was 2514. It is important to note that, in the fall of 2011, the FDOE – Office of Assessment conducted a "vertical scaling study" and changed the DSS ranges "so that performance [could] be compared across all grade levels" (FDOE - Office of Assessment, 2012, p. 3). For this reason, the 2012 FCAT 2.0 Reading DSS ranged from 140 to 302, with 260 being the highest developmental level tested for third grade (FDOE - Office of Assessment, 2012). The reliability of the third grade FCAT 2.0 Reading assessment for all students as well as for the female, male and economically disadvantaged subgroups were above the 0.90 range, the Cronbach Alpha was 0.922, and the Marginal Reliability was 0.911 (FDOE, 2011).

The Mathematics FCAT 2.0

The FCAT 2.0 Mathematics tests were criterion-referenced assessments that were given annually to students enrolled in third through eighth grade. These assessments measured student achievement based on the Next Generation Sunshine State Standards (NGSSS) for mathematics. The third grade FCAT 2.0 Mathematics test was administered in two 70-minute sessions, and consisted only of multiple-choice items. The test was designed to assess students' academic mastery of number operations, problems, and statistics, as well as fractions, geometry, and measurement (FDOE - Office of Assessment, 2012). The 2011 FCAT 2.0 Mathematics DSS ranged from 375 to 2605, with 2225 being the highest developmental level tested for third grade (FDOE - Office of Assessment, 2011). For reasons mentioned above, in the fall of 2011, the FDOE – Office of Assessment changed the 2012 FCAT 2.0 Mathematics DSS range. The new range went from 140 to 298, with 260 being the highest developmental level tested for third grade (FDOE - Office of Assessment, 2012). The reliability of the third grade FCAT 2.0 Mathematics assessment for all students as well as for the female, male and economically disadvantaged subgroups were above the 0.90 range, the Cronbach Alpha was 0.925, and the Marginal Reliability was 0.912 (FDOE, 2011).

Research Questions

The following research questions guided this study:

1. To what extent, if any, is there a difference in the third grade gifted student reading achievement scores based on classroom structure (homogeneous high academic ability verses heterogeneous academic ability)?

   H_0: There is no statistically significant difference in third grade gifted student reading achievement scores based on classroom structure (homogeneous high academic ability verses heterogeneous academic ability).

2. To what extent, if any, is there a difference in the third grade gifted student mathematics achievement scores based on classroom structure (homogeneous high academic ability verses heterogeneous academic ability)?

   H_0: There is no statistically significant difference in third grade gifted student mathematics achievement scores based on classroom structure (homogeneous high academic ability verses heterogeneous academic ability).

3. To what extent can third grade gifted student reading performance be predicted by classroom structure, gender, and socioeconomic status?

   H_0: There is no relationship between reading performance and classroom structure when controlling for gender and socioeconomic status.

4. To what extent can third grade gifted student mathematics performance be predicted by classroom structure, gender, and socioeconomic status?

   H_0: There is no relationship between mathematics performance and classroom structure when controlling for gender and socioeconomic status.

Data Analysis

To answer research question 1 (to what extent, if any, is there a difference in the third grade gifted student reading achievement scores based on classroom structure?), an independent samples t-test was computed.

To answer research question 2 (to what extent, if any, is there a difference in the third grade gifted student mathematics achievement scores based on classroom structure?), an independent samples t-test was computed.

To answer research question 3 (to what extent can third grade gifted student reading performance be predicted by classroom structure, gender, and socioeconomic status?), a multiple linear regression model analysis was conducted.

To answer research question 4 (to what extent can third grade gifted student mathematics performance be predicted by classroom structure, gender, and socioeconomic status?), a multiple linear regression model analysis was conducted.

Summary

In this chapter the researcher presented the methodology that was used to determine if gifted learners' academic performance deviates from one another based on classroom structure. The researcher also presented the methodology that was used to predict students academic performance based on classroom structure, gender, and socioeconomic status. The methodology section included an introduction as well as an overview of the research design, a description of the population and sample, and the methods of data collection. Also, in this chapter the instrumentation that was used to obtain the research data were described. In addition, the research questions and null hypotheses were restated, and finally, the statistical analysis was explained. Per protocol, this study was submitted to the University of Central Florida (UCF) Institutional Review Board (IRB) for approval. The UCF IRB Office of Research and Commercialization determined that the study was not human research as defined by the Department of Health and Human Services regulations at 45 Code of Federal Regulations 46 or Food and Drug Administration regulations at 21 Code of Federal Regulations 50/56; and therefore, was exempt from the UCF IRB review and approval (see Appendix A).

CHAPTER 4
ANALYSIS OF DATA

The intent of this study was to render evidence to assist understanding the type of classroom learning structure either homogeneous high academic ability learning environment or a heterogeneous academic ability learning environment that is conducive for increasing the academic performance of gifted learners. The purpose of this study was actualized by examining the difference the type of classroom structure had on third grade gifted students' reading and mathematics performance on standardized tests. In addition, the extent to which third grade gifted students' reading and mathematics performance could be predicted based on classroom structure, student gender, and students' free and reduced lunch status was calculated. The descriptive statistics section of this chapter provides the third grade gifted student population demographic information separated into each of the two school years studied. Chapter 4 also provides findings for each research question. Findings are organized and presented first by question and then by school year studied. Using students' DSS as the dependent variable, the four research questions were answered by either an independent sample t-test or a multiple linear regression model analysis.

Descriptive Statistics

Population

The population of this research study consisted of 923 third grade gifted students who attended Brevard County Florida Public Schools in either the 2010-2011 school year or the 2011-2012 school year. To qualify as part of the population the third grade gifted student had to have scores from both third grade FCAT 2.0 Reading and Mathematics. Students attending public elementary charter or virtual schools were not included in the population.

Of the 479 gifted third graders who attended one of Brevard County Florida Public Schools in the 2010-2011 school year 43% were female and 57% were male, 39% qualified for free or reduced lunch, and less than 8% learned in a homogeneous high academic ability classroom structure. Of the 444 gifted third graders who attended one of Brevard County Florida Public Schools in the 2011-2012 school year 45% were female and 55% were male, 40% qualified for free or reduced lunch, and less than 8% learned in a homogeneous high academic ability classroom structure. Table 2 depicts the population demographic information by school year.

Table 2

Population Demographic Information

Third Grade Gifted Students	2010-2011 School Year	2011-2012 School Year
Total	479	444
Female	207	200
Male	272	244
Learned in Homogeneous High Ability Classroom Structure	32	32
Qualified For Free & Reduced Lunch	188	179

Sample

All 64 of the third grade gifted students taught in a homogeneous high academic ability classroom structure (classroom structure where at least half the students in the class were gifted) were part of the sample used in this study (32 students during the 2010-2011 school year, and 32 students during the 2011-2012 school year). The same number of third grade gifted students who were taught in a heterogeneous academic ability classroom structure (classroom structure where less than half the students in the class were gifted) was randomly selected from the remaining third grade gifted population using SPSS's random generator.

Findings

The statement of the problem that formed the basis of this study was summarized by the question, "To what extent does the reading and mathematics achievement of third grade gifted students differ based on classroom structure?" In addition to classroom structure, gender and socioeconomic status was also examined; specifically, this research examined the extent to which third grade gifted students' reading and mathematics performance could be predicted based on classroom structure, student gender, and students' free and reduced lunch status. The following definitive research questions guided this study:

Research Question One

Question 1: To what extent, if any, is there a difference in the third grade gifted student reading achievement scores based on classroom structure (homogeneous high academic ability verses heterogeneous academic ability)? The first research question prompted an independent samples t-test for each of the two school years examined in this study.

The 2010-2011 School Year

Using an alpha of .05, an independent samples t-test was conducted to determine if a difference existed in the reading achievement scores of gifted third grade students who were taught in a homogeneous high academic ability classroom and those who were taught in a heterogeneous academic ability classroom. Because there was no relationship between the observations the assumption of independence was met. Student participants could be in either the homogeneous high academic ability classroom or the heterogeneous academic ability classroom, but not both. Upon inspection of the boxplots an outlier was discovered in the heterogeneous academic ability group. The outlier was replaced with the next closest non-outlier observation. See Figure 2 for the updated boxplots.

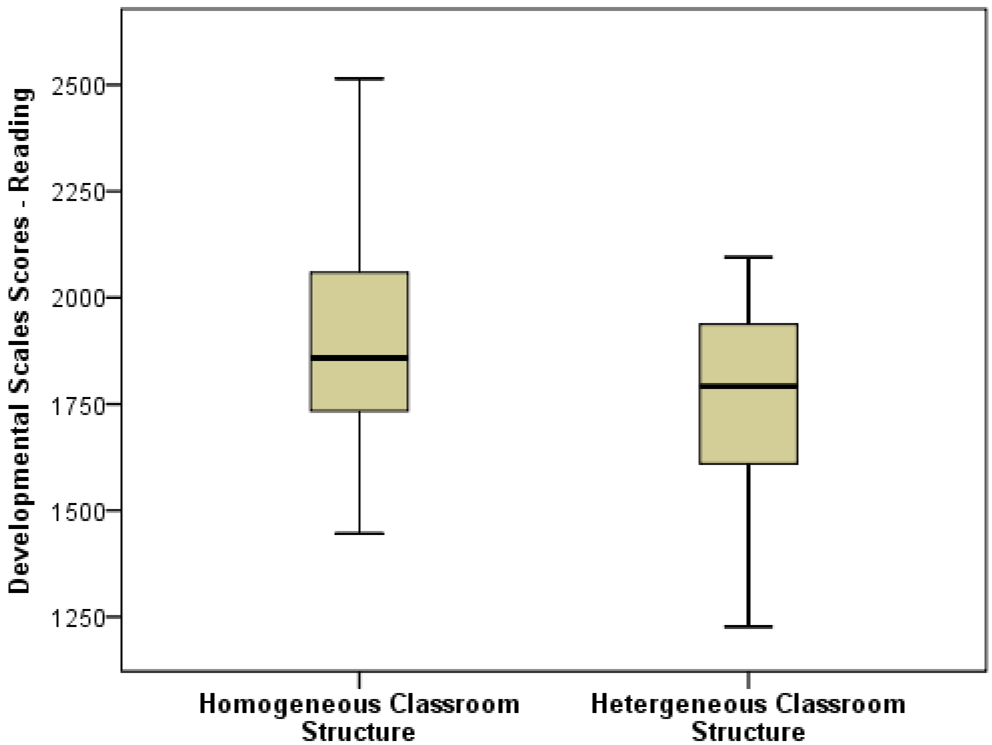

Figure 2: Boxplots of Students' 2011 Developmental Scale Scores for Reading

Next, the assumption of normality was tested. For the students learning in the homogeneous high academic classroom structure, review of the skewness (.821) and kurtosis (-.322) statistics, and also the Q-Q plot, as seen in Figure 3, indicated normality. However, review of the Shapiro-Wilk's test for normality statistic (p = .001) indicated that the assumption of normality was violated. Regardless, the researcher proceeded with the independent samples t-test because according to Lomax (2007), independent samples t-tests are relatively robust to violations of the normality assumption when sample sizes are 10 or greater and when the sample size of each group are equal.

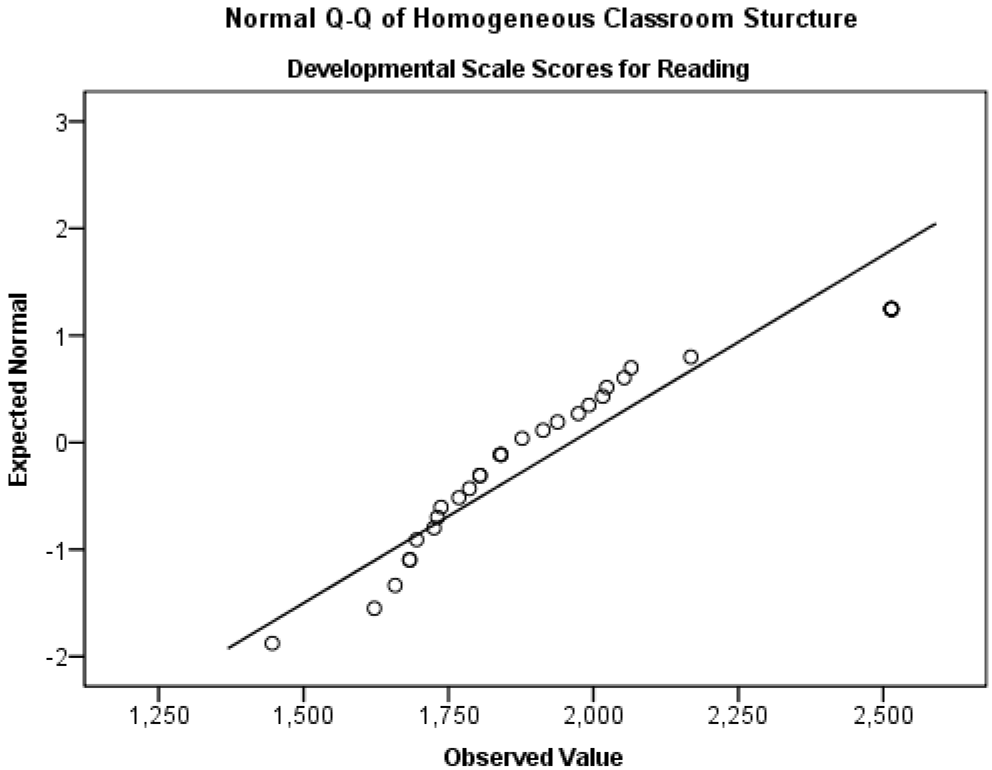

Figure 3: Normal Q-Q Plot of Homogeneous Classroom Structure Students' 2011 Developmental Scale Scores for Reading

For students learning in the heterogeneous classroom structure, review of the Shapiro-Wilk's test for normality (p = .480), the Q-Q plot, as seen in Figure 4, and the skewness (-.506) and kurtosis (.006) statistics indicated that normality was a reasonable assumption. Levene's Test for Equality of Variances (F = 4.118, p = .047) indicated that the homogeneity of variance was violated, so the Welch-Satterthwaite correction and separate variances were used.

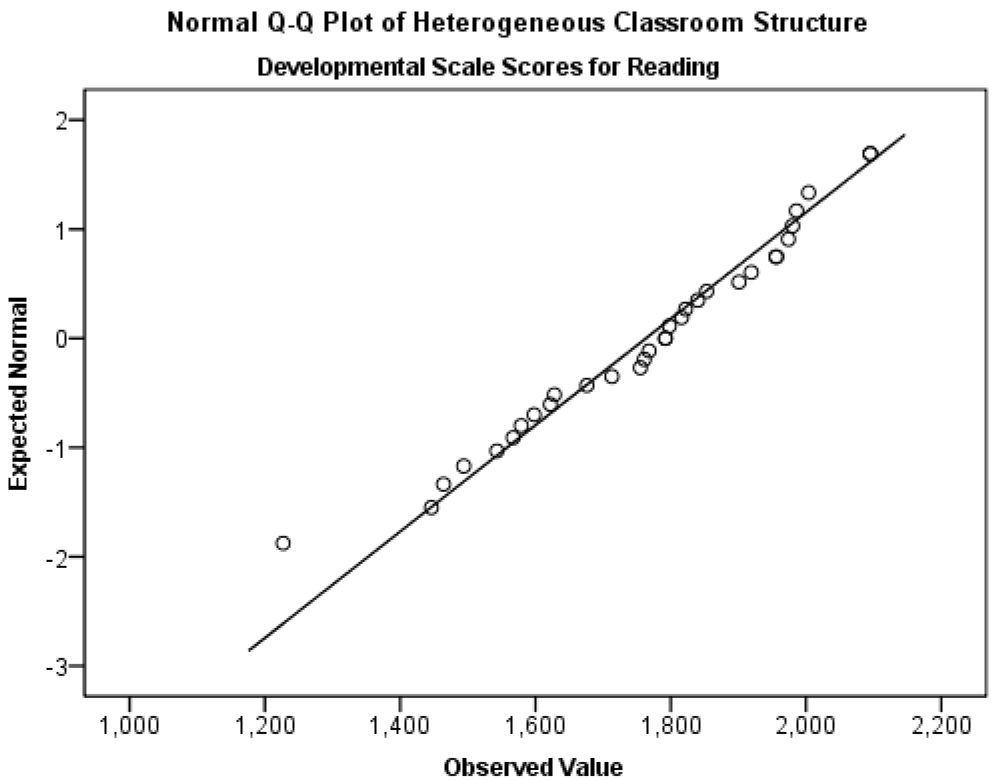

Figure 4: Normal Q-Q Plot of Heterogeneous Classroom Structure Students' 2011 Developmental Scale Scores for Reading

The independent samples t-test results indicated that there was a statistically significant difference in the reading achievement scores between third grade gifted student who learned in a homogeneous high academic ability classroom structure and those who learned in a heterogeneous academic ability classroom structure $t(54.052) = 3.033$, $p = .004$. Students learning in the homogeneous classroom structure ($n = 32$, $M = 1961.41$, $SD = 307.54$) scored higher on average then the students learning in the heterogeneous classroom structure ($n = 32$, $M = 1763.13$, $SD = 205.307$). The 95% confidence interval for the difference between means was 67.231 to 329.332. The effect size of .145 was computed by eta squared; indicating a large effect in which approximately 14.5% of the variance in reading scores could be accounted for by classroom structure.

The 2011-2012 School Year

Using an alpha of .05, an independent samples t-test was conducted to determine if a difference existed in the reading achievement scores of gifted third grade students who were taught in a homogeneous high academic ability classroom and those who were taught in a heterogeneous academic ability classroom. Student participants could be in either the homogeneous high academic ability classroom or the heterogeneous academic ability classroom, but not in both, guaranteeing independence of observation. Also, it was determined by inspection of the boxplots shown in Figure 5 that there were no outliers in the data sampled.

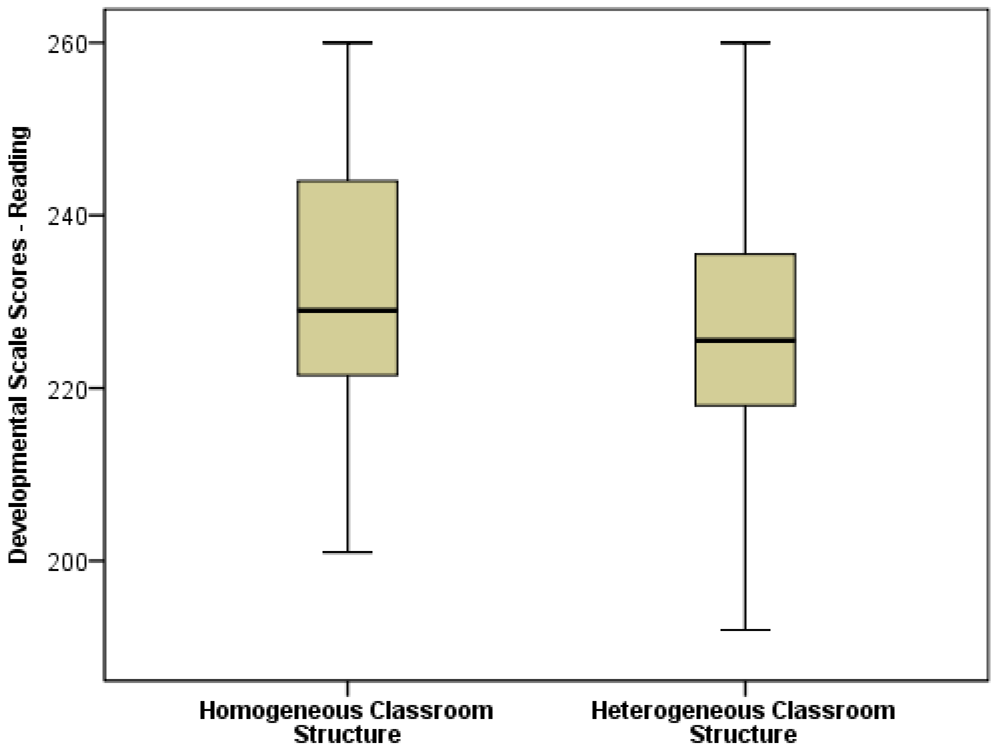

Figure 5: Boxplots of Students' 2012 Developmental Scale Scores for Reading

The assumption of normality was tested and met. For students learning in the homogeneous high academic classroom structure, review of the Shapiro-Wilk's test for normality (p = .396), and the skewness (.197) and kurtosis (-.398) statistics as well as the Q-Q plot shown in Figure 6 indicated that normality was a reasonable assumption.

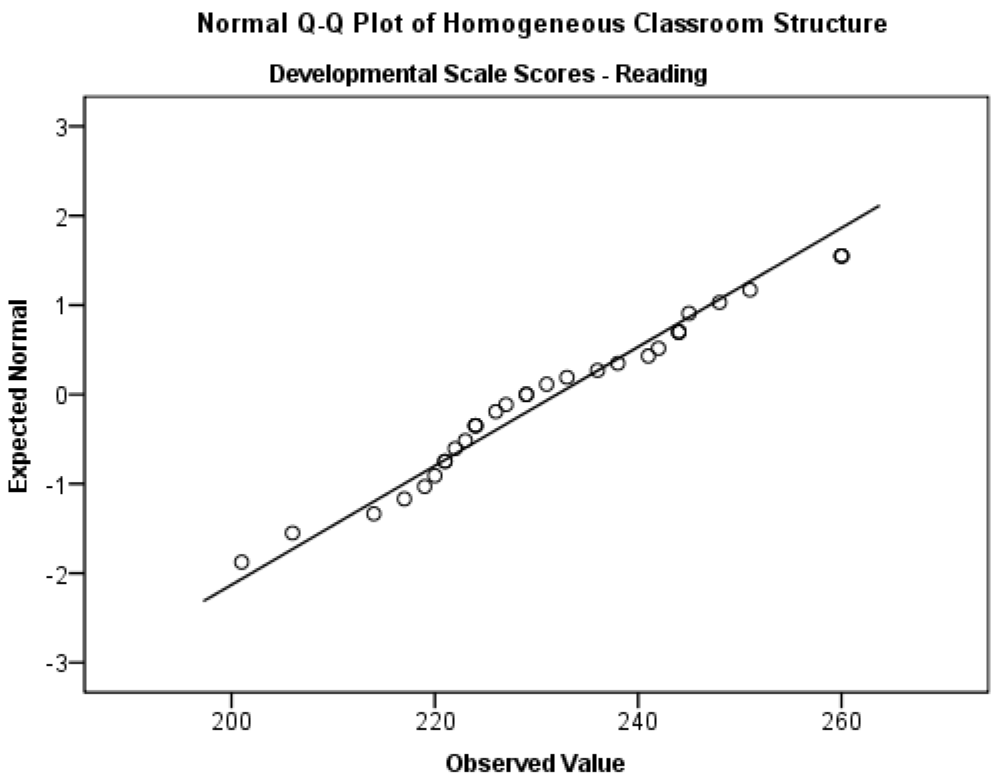

Figure 6: Normal Q-Q Plot of Homogeneous Classroom Structure Students' 2012 Developmental Scale Scores for Reading

For students learning in the heterogeneous classroom structure, review of the Shapiro-Wilk's test for normality (*p* = .057), skewness (.471) and kurtosis (.249) statistics as well as the Q-Q plot shown in Figure 7 indicated that normality was a reasonable assumption. Levene's Test for Equality of Variances indicated that the homogeneity of variance assumption was met (*F* = .007, *p* = .933).

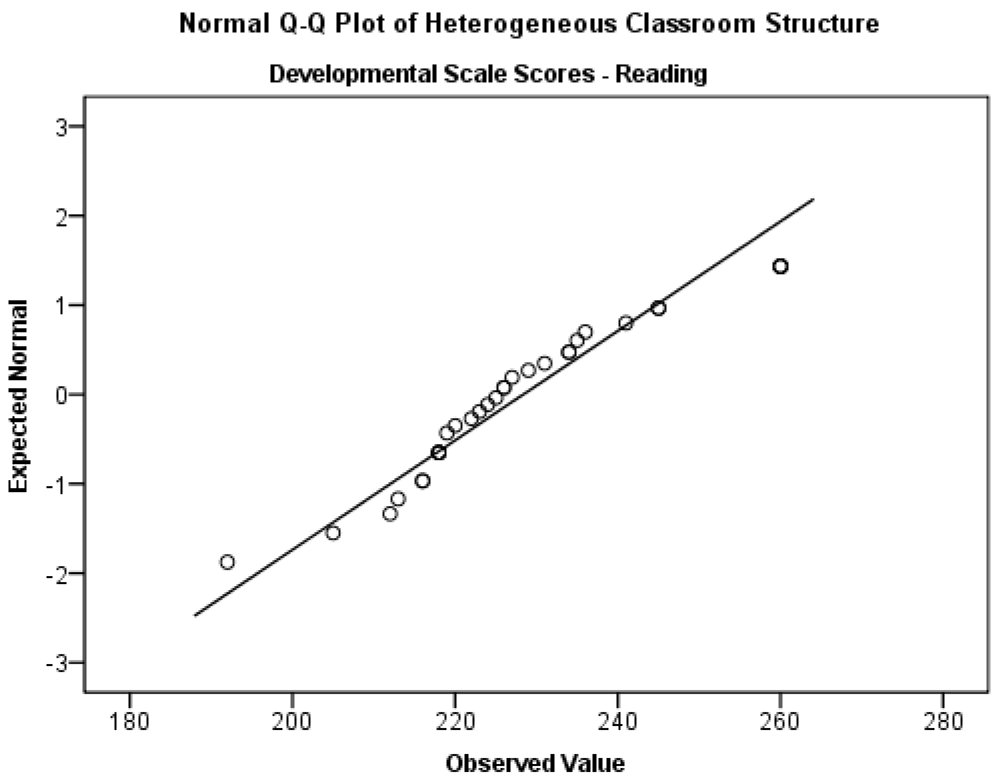

Figure 7: Normal Q-Q Plot of Heterogeneous Classroom Structure Students' 2012 Developmental Scale Scores for Reading

The independent samples t-test results indicated that there was no statistically significant difference in the reading achievement scores between third grade gifted student who learned in a homogeneous high academic ability classroom structure and those who learned in a heterogeneous academic ability classroom structure $t(62) = .924$, $p = .359$. Students learning in the homogeneous classroom structure ($n = 32$, $M = 232.0$, $SD = 15.025$) scored similar on average to the students learning in the heterogeneous classroom structure ($n = 32$, $M = 228.38$, $SD = 16.331$). The 95% confidence interval for the difference between means included zero and was -4.217 to 11.467. A small effect size of .0136 was computed by eta squared which indicated that approximately less than 1.5% of the variance in reading scores could be accounted for by classroom structure.

Research Question Two

Question 2: To what extent, if any, is there a difference in the third grade gifted student mathematics achievement scores based on classroom structure (homogeneous high academic ability verses heterogeneous academic ability)? The second research question also assessed the results of an independent samples t-test for each of the two school years examined in this study.

The 2010-2011 School Year

Using an alpha of .05, an independent samples t-test was conducted to determine if a difference existed in the mathematics achievement scores of gifted third grade students who were taught in a homogeneous high academic ability classroom and those who were taught in a heterogeneous academic ability classroom. The assumption of independence was met because student participants could be in either the homogeneous high academic ability classroom or the heterogeneous academic ability classroom, but not both. It was determined by inspection of the boxplots shown in Figure 8 that there were no outliers in the data sampled.

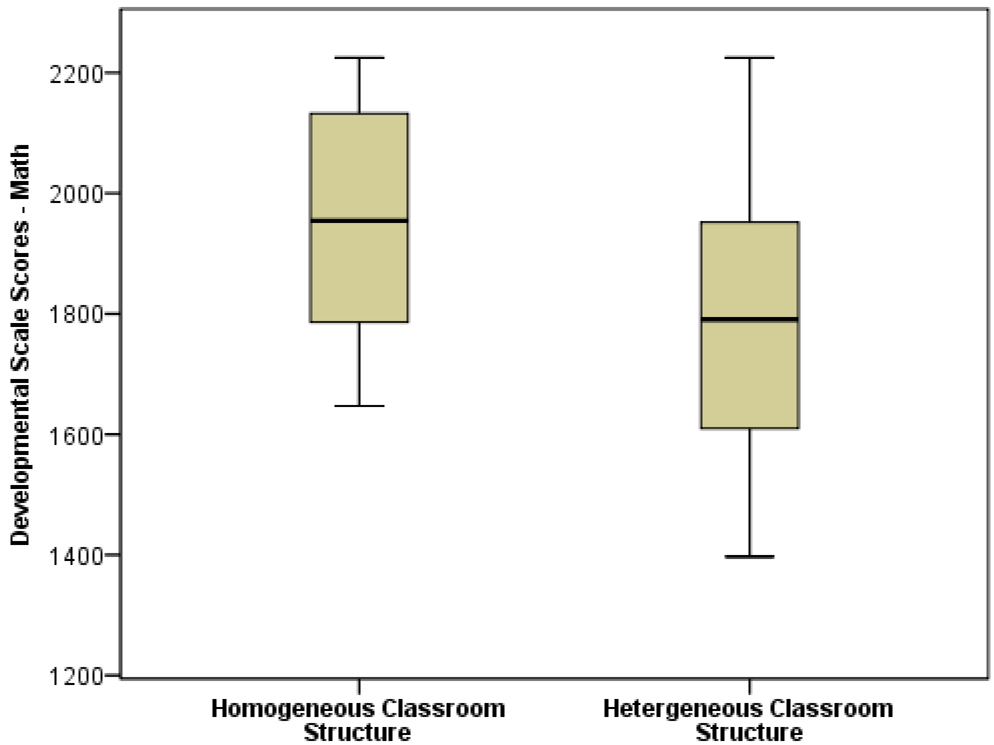

Figure 8: Boxplots of Students' 2011 Developmental Scale Scores for Mathematics

Next, the assumption of normality was tested. For the students learning in the homogeneous high academic ability classroom structure, review of the skewness (.218) and kurtosis (-1.12) statistics as well as the Q-Q plot, as seen in Figure 9, indicated normality. However, according to the Shapiro-Wilk's test for normality (p = .008), the assumption of normality was violated. While duly noted, the violation of normality did not hinder the independent samples t-test because, according to Lomax (2007), independent samples t-tests are relatively robust to violations of the normality assumption when sample sizes are 10 or greater and when the sample size of each group are equal.

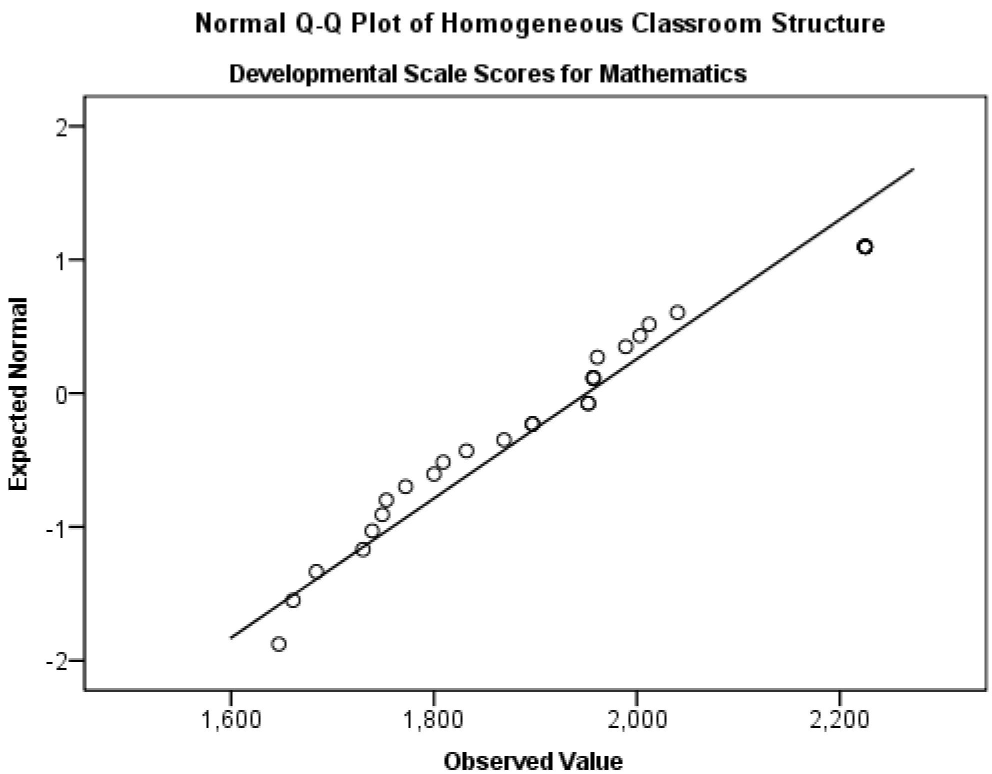

Figure 9: Normal Q-Q Plot of Homogeneous Classroom Structure Students' 2011 Developmental Scale Scores for Mathematics

For the students learning in the heterogeneous classroom structure, review of the Shapiro-Wilk's test for normality (p = .307), skewness (.334) and kurtosis (-.616) statistics, and also the Q-Q plot, seen in Figure 10, all indicated that normality was a reasonable assumption. Levene's Test for Equality of Variances indicated that the homogeneity of variance assumption was met (F = 1.505, p = .225).

The independent samples t-test results indicated that there was a statistically significant difference in the mathematics achievement scores between third grade gifted student who learned in a homogeneous high academic ability classroom structure and those who learned in a heterogeneous academic ability classroom structure $t(62) = 3.152$, p = .003.

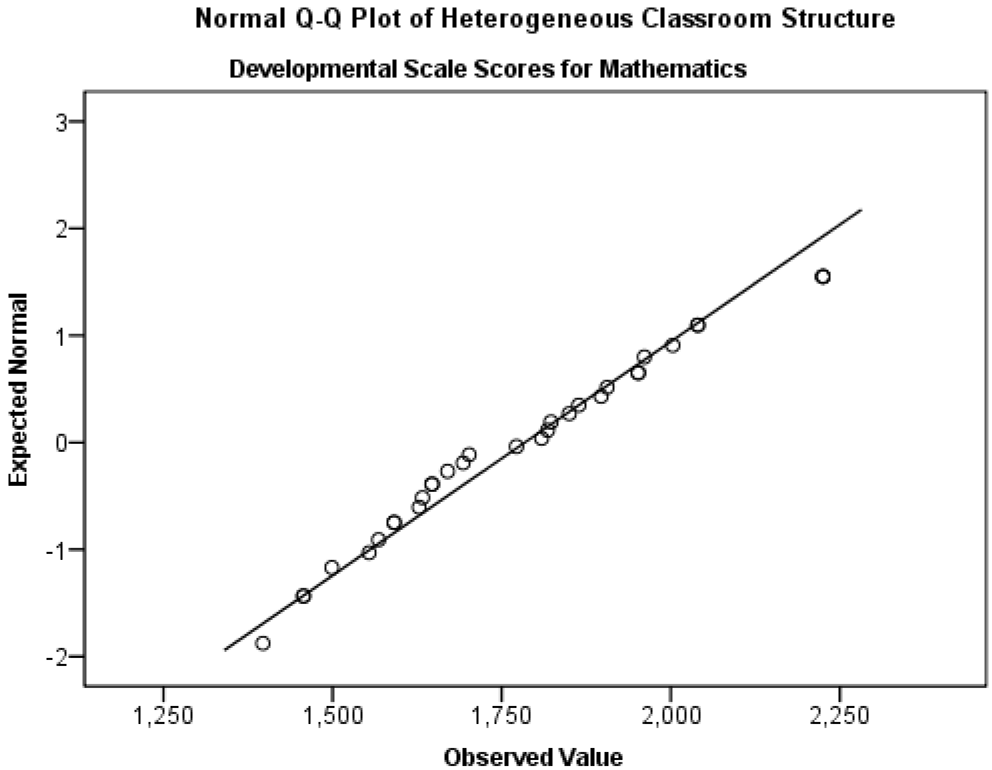

Figure 10: Normal Q-Q Plot of Heterogeneous Classroom Structure Students' 2011 Developmental Scale Scores for Mathematics

Students learning in the homogeneous high academic ability classroom structure (*n* = 32, *M* = 1950.59, *SD* = 191.76) scored higher on average then the students learning in the heterogeneous academic ability classroom structure (*n* = 32, *M* = 1784.25, *SD* = 228.86). The 95% confidence interval for the difference between means was 60.835 to 271.853. The effect size of .138 was computed by eta squared; indicating a large effect in which approximately 14% of the variance in mathematics scores could be accounted for by classroom structure.

The 2011-2012 School Year

Using an alpha of .05, an independent samples t-test was conducted to determine if a difference existed in the mathematics achievement scores of gifted third grade students who were taught in a homogeneous high academic ability classroom and those who were taught in a heterogeneous academic ability classroom. The assumption of independence was met. Student participants could be in either the homogeneous high academic ability classroom or the heterogeneous academic ability classroom, but not both. Upon inspection of the boxplots an outlier was discovered in the heterogeneous academic ability group. The outlier was replaced with the next closest non-outlier observation. See Figure 11 for the updated boxplots.

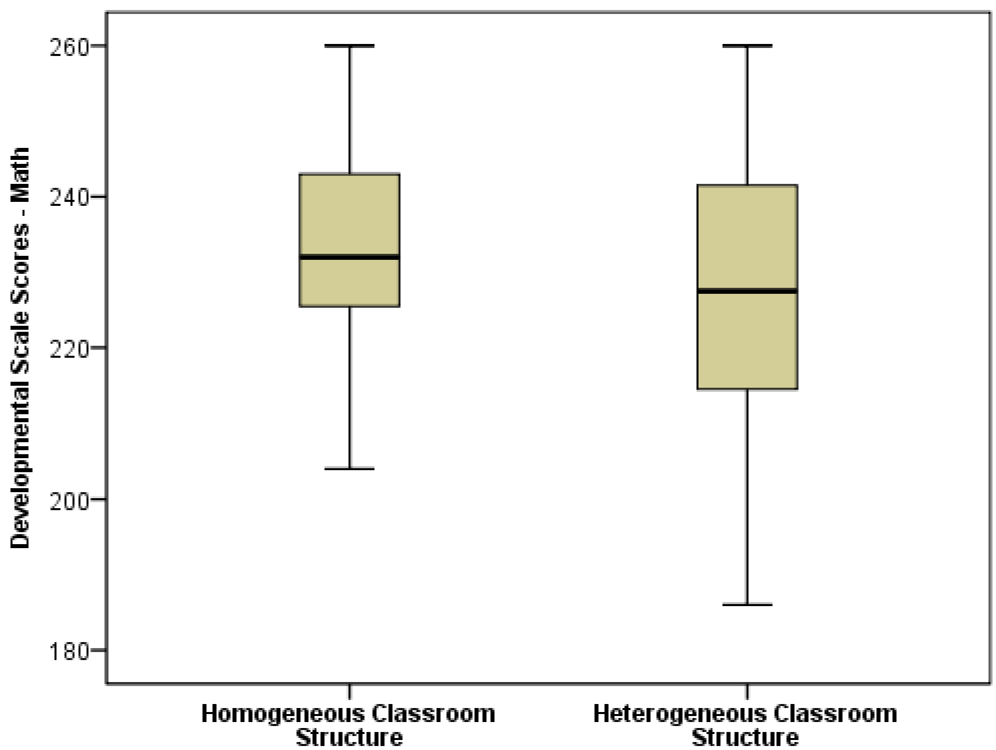

Figure 11: Boxplots of Students' 2012 Developmental Scale Scores for Mathematics

Next, the assumption of normality was tested. For the students learning in the homogeneous high academic ability classroom structure, the review of skewness (.214) and kurtosis (-.746) statistics as well as the Q-Q plot, as seen in Figure 12, indicated normality. However, according to the Shapiro-Wilk's test for normality (p = .029), the assumption of normality was violated. While duly noted, the researcher continued on with the independent samples t-test because, according to Lomax (2007), independent samples t-tests are relatively robust to violations of the normality assumption when sample sizes are 10 or greater and when the sample size of each group are equal.

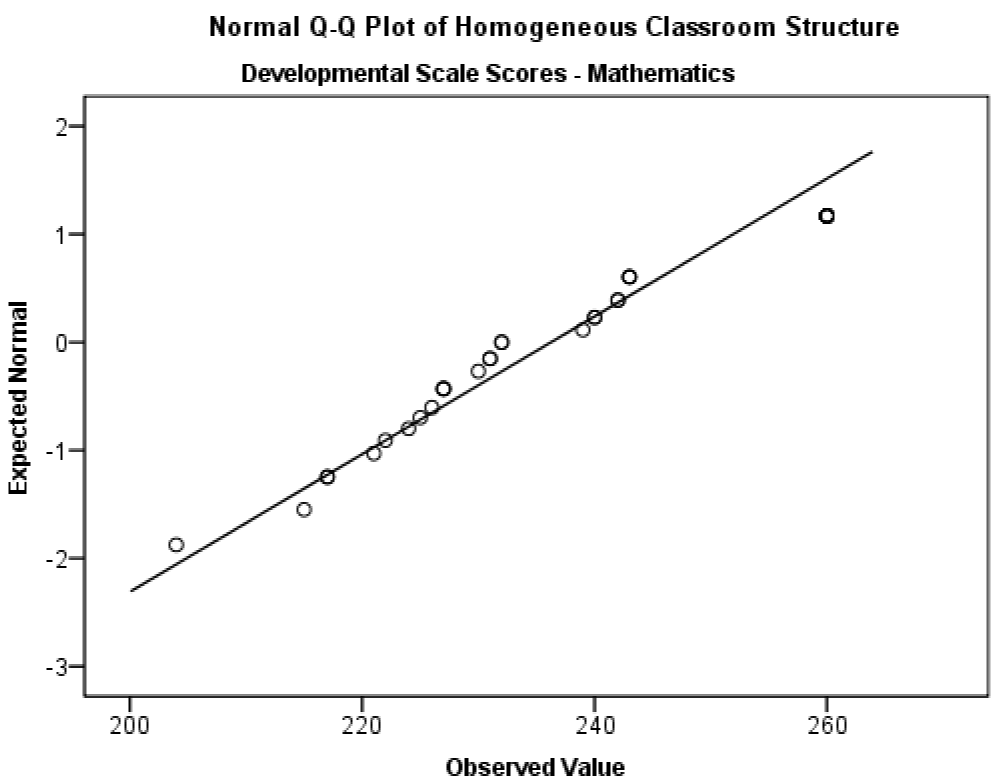

Figure 12: Normal Q-Q Plot of Homogeneous Classroom Structure Students' 2012 Developmental Scale Scores for Mathematics

For the students learning in the heterogeneous academic ability classroom structure, review of the Shapiro-Wilk's test for normality (p = .180), skewness (.146) and kurtosis (-.528) statistics, and also the Q-Q plot, seen in Figure 13, all indicated that normality was a reasonable assumption. Levene's Test for Equality of Variances indicated that the homogeneity of variance assumption was met (F = 1.235, p = .271).

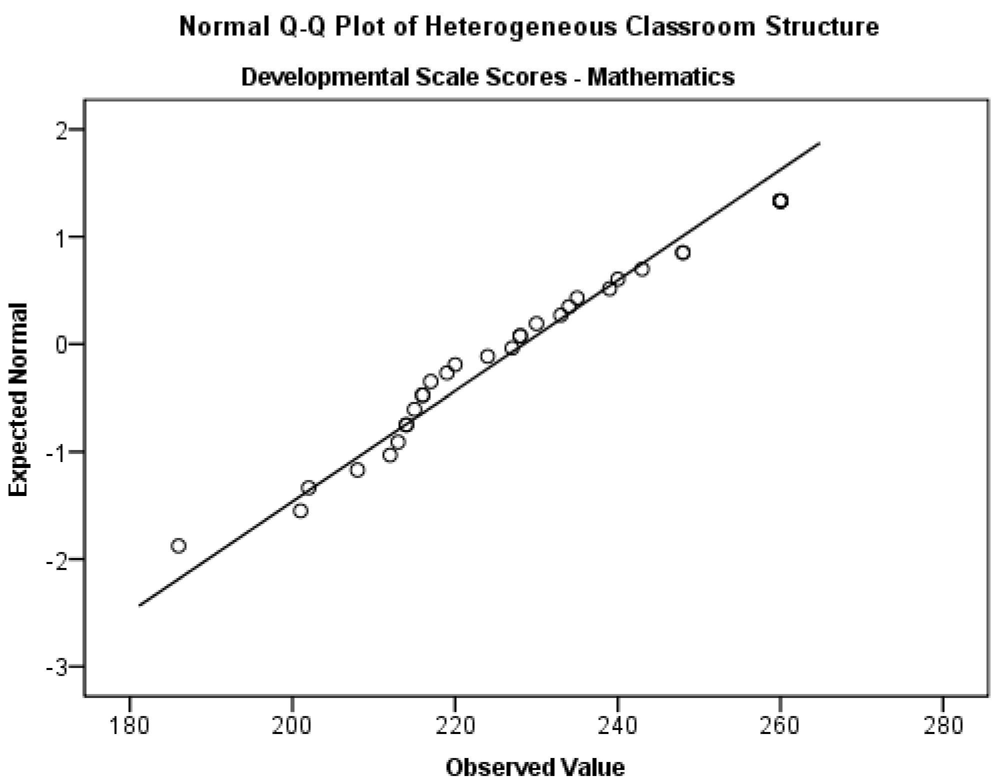

Figure 13: Normal Q-Q Plot of Heterogeneous Classroom Structure Students' 2012 Developmental Scale Scores for Mathematics

The independent samples t-test results indicated that there was no statistically significant difference in the mathematics achievement scores between third grade gifted student who learned in a homogeneous high academic ability classroom structure and those who learned in a heterogeneous academic ability classroom structure $t(62)$ = 1.77, p = .082. Students learning in the homogeneous classroom structure (*n* = 32, *M* = 236.25, *SD* = 15.682) scored similar on average to the students learning in the heterogeneous academic ability classroom structure (*n* = 32, *M* = 228.44, *SD* = 19.427). The 95% confidence interval for the difference between means included zero and was -1.01 to 16.635. The moderate effect size of .0481 was computed by eta squared which indicated that approximately less than 5% of the variance in mathematics scores could be accounted for by classroom structure.

Research Question Three

Question 3: To what extent can third grade gifted student reading performance be predicted by classroom structure, gender, and socioeconomic status? The third research question prompted a multiple linear regression analysis for each of the two school years examined in this study. It is important to note that because 2011 and 2012 DSS were calculated on completely different scales, separate models were built for each year.

The 2010-2011 School Year Model

Each independent variable was entered in separately to determine if it made a difference in predicting the 2011 FCAT 2.0 Reading DSS while holding previously entered variables constant. The multiple linear regression assumptions were tested and met; see Appendix C for summary of results. Initial review of centered leverage values, Cook's distance, and scatterplots suggest that there were no outliers. Although it was difficult to determine linearity with binary independent variables, the plot of the dependent vs. each independent variable did not appear inappropriate. Also, the scatterplots of studentized residuals to predicted values and studentized residuals to each independent variable indicated linearity. Again, even though linearity is difficult to determine with binary independent variables, the results did not appear inappropriate.

Unstandardized residuals were examined for normality. The skewness (.59) and kurtosis (.65) statistics as well as the Q-Q plots and histogram indicated normality. See Figure 14 for the Unstandardized Residual Q-Q plot and Figure 15 for the unstandardized histogram. Also, the boxplot of unstandardized residuals showed no extreme outliers.

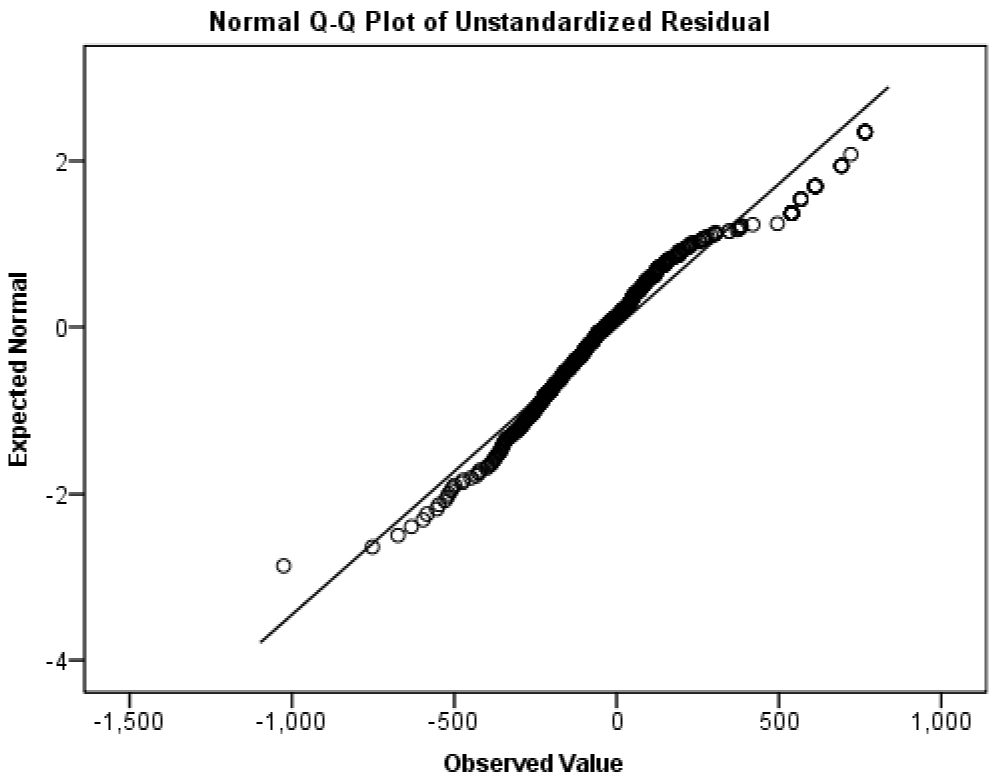

Figure 14: Normal Q-Q Plot of Unstandardized Residual - Students' 2011 Developmental Scale Scores for Reading

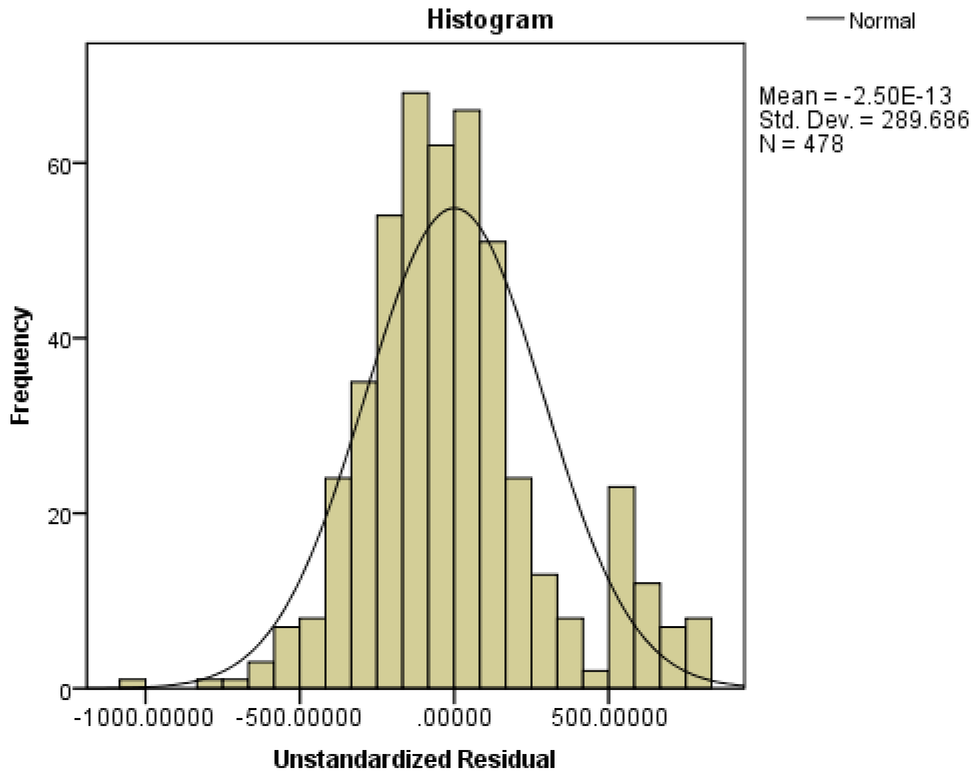

Figure 15: Histogram of Unstandardized Residual - Students' 2011 Developmental Scale Scores for Reading

While it was difficult to determine with binary independent variables, the assumption of independence was met because the scatterplot of studentized residuals to unstandardized predicted DSS did not appear inappropriate. This is also true for homogeneity of variance. The scatterplot of studentized residuals to predicted values did not appear to be inappropriate; this suggested homogeneity of variance. Finally, there was no problem with multicollinearity. Tolerance was greater than .10 (.97), variance inflation factor was less than 10 (1.03), there were not multiple eigenvalues close to zero (3.11, .56, .30, .03), and the condition indices were smaller than 15 (9.70). Table 3 shows regression results for each of the separate analyses in block format.

Table 3

Summary of Hierarchical Regression Analysis for Demographic and Class Factors Predicting 2011 FCAT Reading DSS (N = 479)

	Model 1			Model 2			Model 3		
Variable	*B*	*SE B*	β	*B*	*SE B*	β	*B*	*SE B*	β
Constant	1,914.75	20.87		1,979.35	23.08		2,019.06	53.87	
Gender	-67.25	27.71	-.11*	-72.64	26.83	-.12**	-72.84	26.84	-.12**
Free/Reduced Lunch				-157.31	27.24	-.26**	-153.64	27.62	-.25**
Class Structure							-43.97	53.91	-.04
R^2		.01			.07			.07	
F for Δ in R^2		5.89*			33.34**			0.67	

**p* < .05. ***p* < .01.

Block 1: Gender

Gender was the first independent variable examined. At this point in the analysis gender was statistically significant F (1, 476) = 5.89, $p = .02$. There was little variation in DSS with $R^2 = .012$, indicating that less than 1.2% of the variance in reading scores could be explained by gender.

Block 2: Socioeconomic Status

The addition of socioeconomic status while holding gender constant yielded a statistically significant addition to the model, ΔF (1, 475) = 33.34, $p < .001$. A small amount (6.5%) of additional variability was explained with the addition of socioeconomic status: $\Delta R^2 = .065$.

Block 3: Class Structure

The addition of class structure while holding gender and socioeconomic status constant did not yield a significant addition to the model, ΔF (1, 474) = 0.67, $p < .41$. There was practically no additional variability explained with the addition of class structure: $\Delta R^2 = .001$ (0.1% additional variability explained).

Final Model:

The regression equation for predicting Reading DSS as a result of gender, socioeconomic status, and classroom structure is:

Reading DSS = 2,019.06 – 72.84 * (Gender) – 153.64 * (Free and Reduced Lunch) – 43.97 * (Class Structure).

The overall model was statistically significant: F (3, 474) = 13.42, $p < .001$. The multiple correlation coefficient ($R = .28$) indicated a weak relationship between observed and model-

predicted values of the dependent variable. As shown in Table 4, the independent variables were interpreted as follows: male gender represented by a 1, and female gender by a 0; receiving free or reduced lunch represented by a 1, and not receiving free or reduced lunch represented by a 0; heterogeneous classroom structure represented by a 1, and homogeneous classroom structure represented by a 0.

Table 4

Model Interpretations of the Independent Variables

Independent Variables	**Represented By**	
	1	**0**
Gender	Male	Female
Socioeconomic Status	Receiving Free or Reduced Lunch	Not Receiving Free or Reduced Lunch (Low-SES)
Classroom Structure	Heterogeneous Academic Ability Classroom Structure	Homogeneous High Academic Ability Classroom

<u>The 2011-2012 School Year Model</u>

Each independent variable was entered in separately to determine if it made a difference in predicting the 2012 FCAT 2.0 Reading DSS while holding previously entered variables constant. The multiple linear regression assumptions were tested and met; see Appendix C for summary of results. Initial review of centered leverage values, Cook's distance, and scatterplots suggest that there were no outliers. Although it was difficult to determine linearity with binary independent variables, the plot of the dependent vs. each independent variable did not appear inappropriate. Also, the scatterplots of studentized residuals to predicted values and studentized residuals to each independent variable indicated linearity. Again, even though linearity is difficult to determine with binary independent variables, the results did not appear inappropriate.

Unstandardized residuals were examined for normality. The skewness (.32) and kurtosis (.09) statistics as well as the Q-Q plots and histogram indicated normality. See Figure 16 for the Unstandardized Residual Q-Q plot and Figure 17 for the unstandardized histogram. Also, the boxplot of unstandardized residuals showed no extreme outliers.

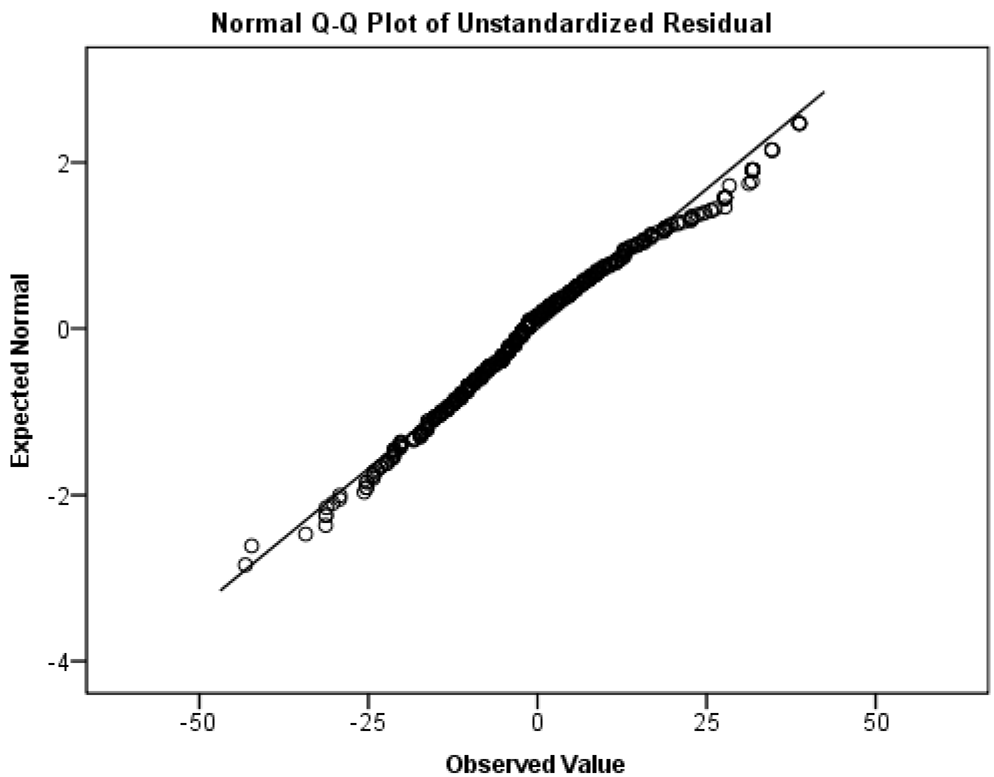

Figure 16: Normal Q-Q Plot of Unstandardized Residual - Students' 2012 Developmental Scale Scores for Reading

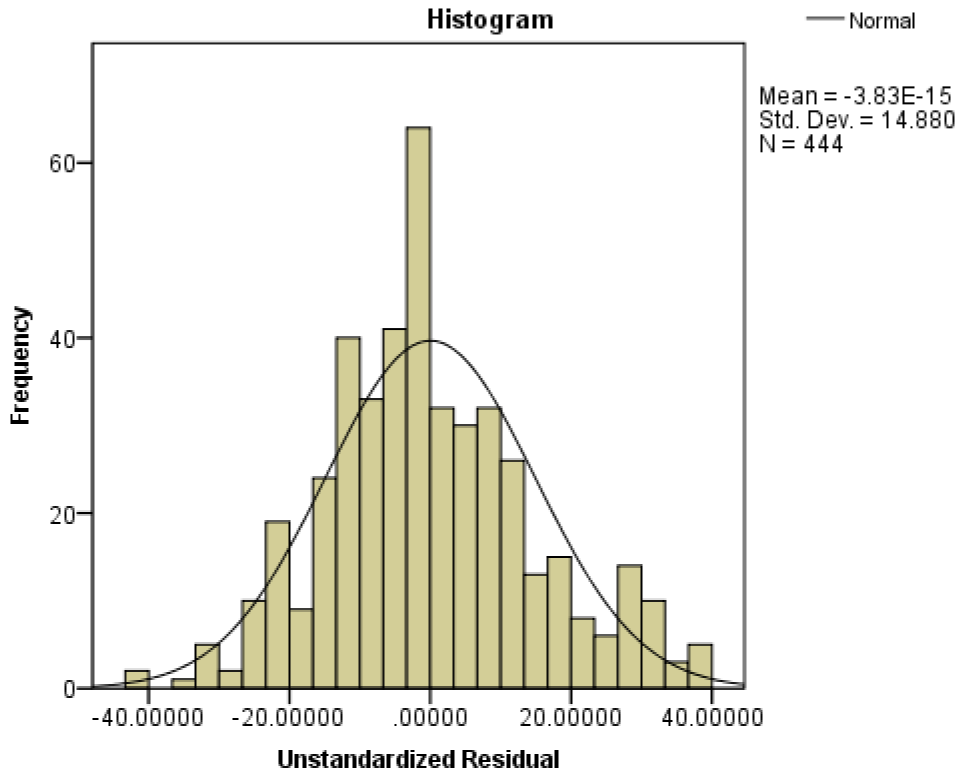

Figure 17: Histogram of Unstandardized Residual - Students' 2012 Developmental Scale Scores for Reading

While it was difficult to determine with binary independent variables, the assumption of independence was met because the scatterplot of studentized residuals to unstandardized predicted DSS did not appear inappropriate. This is also true for homogeneity of variance. The scatterplot of studentized residuals to predicted values did not appear to be inappropriate; this suggested homogeneity of variance. Finally, there was no problem with multicollinearity. Tolerance was greater than .10 (.99), variance inflation factor was less than 10 (1.01), there were not multiple eigenvalues close to zero (3.10, .56, .31, .03), and the condition indices were smaller than 15 (9.29). Table 5 shows the results for each of the separate analyses in block format.

Table 5

Summary of Hierarchical Regression Analysis for Demographic and Class Factors Predicting 2012 FCAT Reading DSS (N = 444)

	Model 1			Model 2			Model 3		
Variable	*B*	*SE B*	β	*B*	*SE B*	β	*B*	*SE B*	β
Constant	229.63	1.08		232.58	1.22		235.66	2.77	
Gender	-3.91	1.46	-.13**	-4.07	1.43	-.13**	-4.04	1.43	-.13**
Free/Reduced Lunch				-7.11	1.45	-.23**	-6.92	1.45	-.22**
Class Structure							-3.42	2.76	-.06
R^2		.02			.07			.07	
F for Δ in R^2		7.16**			24.19**			1.54	

*p < .05. **p < .01.

Block 1: Gender

Gender was the first independent variable examined. At this point in the analysis gender was statistically significant F (1, 442) = 7.16, p = .008. There was little variation in DSS with R^2 = .016, indicating that less than 1.6% of the variance in reading scores could be explained by gender.

Block 2: Socioeconomic Status

The addition of socioeconomic status while holding gender constant yielded a statistically significant addition to the model, ΔF (1, 441) = 24.19, p < .001. A small amount (5.1%) of additional variability was explained with the addition of socioeconomic status: ΔR^2 = .051.

Block 3: Class Structure

The addition of class structure while holding gender and socioeconomic status constant did not yield a significant addition to the model, ΔF (1, 440) = 1.54, p = .22. There was practically no additional variability explained with the addition of class structure: ΔR^2 = .003 (0.3% additional variability explained).

Final Model:

The regression equation for predicting Reading DSS as a result of gender, socioeconomic status, and classroom structure is:

Reading DSS = 235.66 – 4.04 * (Gender) – 6.92 * (Free and Reduced Lunch) – 3.42 * (Class Structure).

The overall model was statistically significant: F (3, 440) = 11.10, p < .001. The multiple correlation coefficient (R = .26) indicated a weak relationship between observed and model-

predicted values of the dependent variable. As shown in Table 4, the independent variables were interpreted as follows: male gender represented by a 1, and female gender by a 0; receiving free or reduced lunch represented by a 1, and not receiving free or reduced lunch represented by a 0; heterogeneous classroom structure represented by a 1, and homogeneous classroom structure represented by a 0.

Research Question Four

Question 4: To what extent can third grade gifted student mathematics performance be predicted by classroom structure, gender, and socioeconomic status? The fourth research question also commanded a multiple regression. Once again, because the 2011 and 2012 DSS were calculated on completely different scales, separate models were built for each year. The intent was that the DSS be used as a general proxy for student mathematics performance as influenced by the variables of gender, socioeconomic status, and classroom structure.

The 2010-2011 School Year Model

Each independent variable was entered in separately to determine if it made a difference in predicting the 2011 FCAT 2.0 Mathematics DSS while holding previously entered variables constant. The multiple linear regression assumptions were tested and met; see Appendix D for summary of results. Initial review of centered leverage values, Cook's distance, and scatterplots suggest that there were no outliers. Although it was difficult to determine linearity with binary independent variables, the plot of the dependent vs. each independent variable did not appear inappropriate. Also, the scatterplots of studentized residuals to predicted values and studentized residuals to each independent variable indicated linearity. Again, even though linearity is difficult to determine with binary independent variables, the results did not appear inappropriate.

Unstandardized residuals were examined for normality. The skewness (.32) and kurtosis (-.23) statistics as well as the Q-Q plots and histogram indicated normality. See Figure 18 for the Unstandardized Residual Q-Q plot and Figure 19 for the unstandardized histogram. Also, the boxplot of unstandardized residuals showed no extreme outliers.

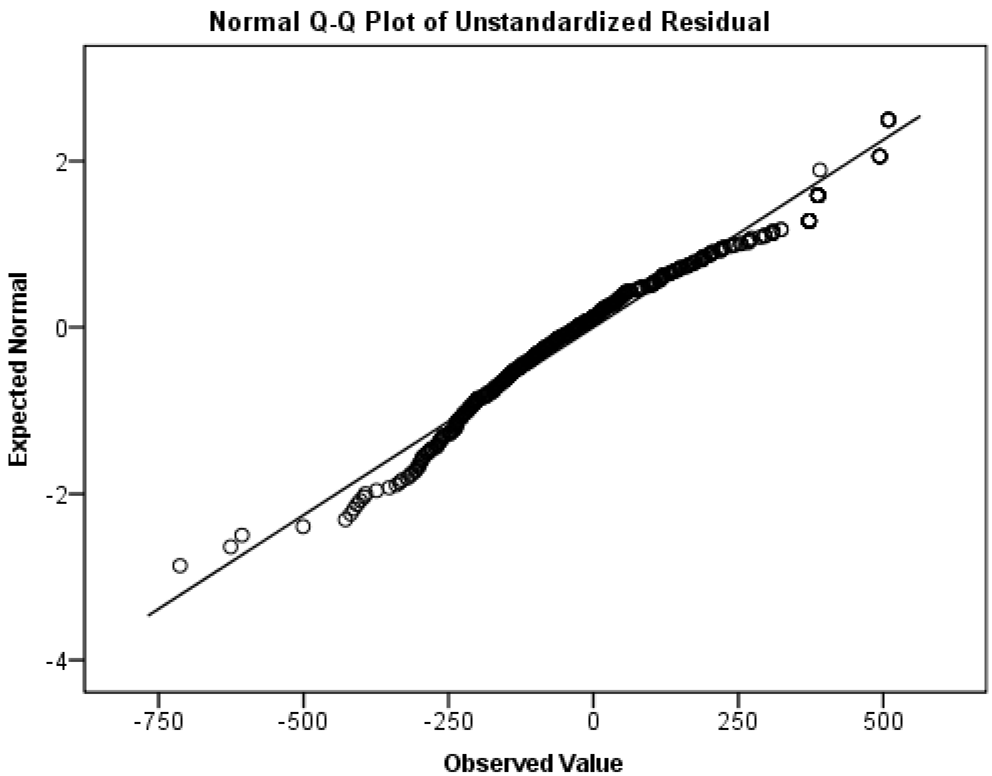

Figure 18: Normal Q-Q Plot of Unstandardized Residual - Students' 2011 Developmental Scale Scores for Mathematics

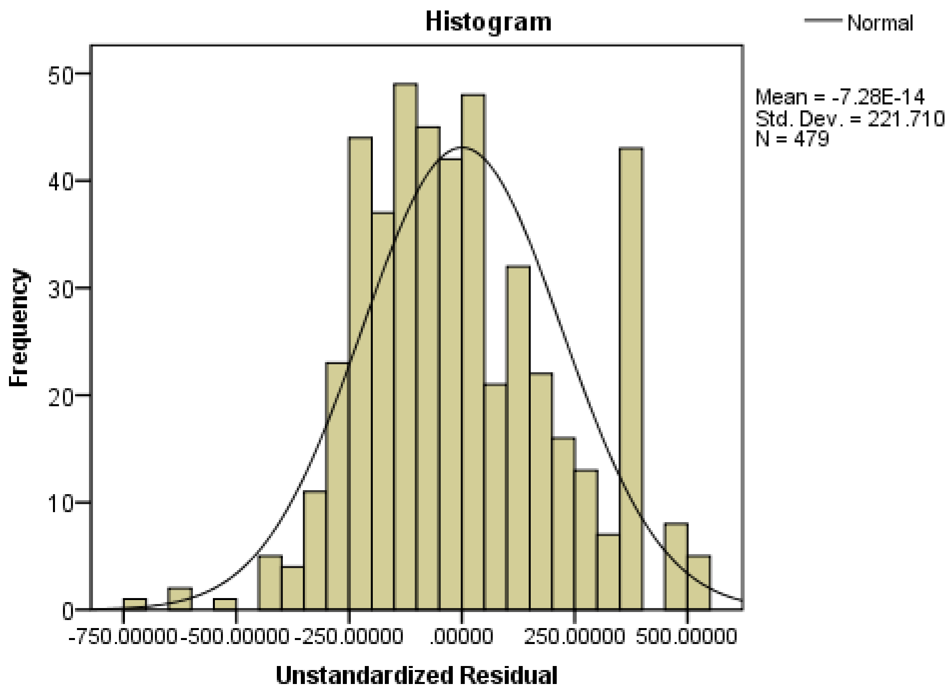

Figure 19: Histogram of Unstandardized Residual - Students' 2011 Developmental Scale Scores for Mathematics

While it was difficult to determine with binary independent variables, the assumption of independence was met because the scatterplot of studentized residuals to unstandardized predicted DSS did not appear inappropriate. This is also true for homogeneity of variance. The scatterplot of studentized residuals to predicted values did not appear to be inappropriate; this suggested homogeneity of variance. Finally, there was no problem with multicollinearity. Tolerance was greater than .10 (.97), variance inflation factor was less than 10 (1.03), there were not multiple eigenvalues close to zero (3.11, .56, .30, .03), and the condition indices were smaller than 15 (9.72). Table 6 shows a model summary of the results for each of the separate analyses in block format.

Table 6

Summary of Hierarchical Regression Analysis for Demographic and Class Factors Predicting 2011 FCAT Math DSS (N = 479)

	Model 1			Model 2			Model 3		
Variable	*B*	*SE B*	β	*B*	*SE B*	β	*B*	*SE B*	β
Constant	1,810.29	16.19		1,864.27	17.80		1,970.87	41.23	
Gender	-10.23	21.48	-.02	-14.43	20.68	-.03	-14.95	20.53	-.03
Free/Reduced Lunch				-131.45	20.98	-.28**	-121.59	21.11	-.26**
Class Structure							-118.07	41.26	-.13**
R^2		—			.08			.09	
F for Δ in R^2		0.23			39.26**			8.19**	

**p* < .05. ***p* < .01.

Block 1: Gender

Gender was the first independent variable examined. At this point in the analysis gender was statistically significant F (1, 477) = 0.23, p = .63. There was practically no variation explained in DSS with $R^2 < .001$, indicating that less than .1% of the variance in mathematics scores could be explained by gender.

Block 2: Socioeconomic Status

The addition of socioeconomic status while holding gender constant yielded a statistically significant addition to the model, ΔF (1, 476) = 39.62, $p < .001$. A small amount (7.6%) of additional variability was explained with the addition of socioeconomic status: $\Delta R^2 = .076$.

Block 3: Class Structure

The addition of class structure while holding gender and socioeconomic status constant yielded a statistically significant addition to the model, ΔF (1, 475) = 8.19, p = .004. There was practically no additional variability explained with the addition of class structure: $\Delta R^2 = .016$ (1.6% additional variability explained).

Final Model:

The regression equation for predicting Mathematics DSS as a result of gender, socioeconomic status, and classroom structure is:

Mathematics DSS = 1970.87 – 11.95 * (Gender) – 121.59 * (Free and Reduced Lunch) – 118.07 * (Class Structure).

The overall model was statistically significant: F (3, 475) = 16.10, $p < .001$. The multiple correlation coefficient (R = .30) indicated a weak relationship between observed and model-

predicted values of the dependent variable. As shown in Table 4, the independent variables were interpreted as follows: male gender represented by a 1, and female gender by a 0; receiving free or reduced lunch represented by a 1, and not receiving free or reduced lunch represented by a 0; heterogeneous classroom structure represented by a 1, and homogeneous classroom structure represented by a 0.

<u>The 2011-2012 School Year Model</u>

Each independent variable was entered in separately to determine if it made a difference in predicting the 2012 FCAT 2.0 Mathematics DSS while holding previously entered variables constant.

The multiple linear regression assumptions were tested and met; see Appendix D for summary of results. Initial review of centered leverage values, Cook's distance, and scatterplots suggest that there were no outliers. Although it was difficult to determine linearity with binary independent variables, the plot of the dependent vs. each independent variable did not appear inappropriate. Also, the scatterplots of studentized residuals to predicted values and studentized residuals to each independent variable indicated linearity. Again, even though linearity is difficult to determine with binary independent variables, the results did not appear inappropriate.

Unstandardized residuals were examined for normality. The skewness (.31) and kurtosis (-.52) statistics as well as the Q-Q plots and histogram indicated normality. See Figure 20 for the Unstandardized Residual Q-Q plot and Figure 21 for the unstandardized histogram. Also, the boxplot of unstandardized residuals showed no extreme outliers.

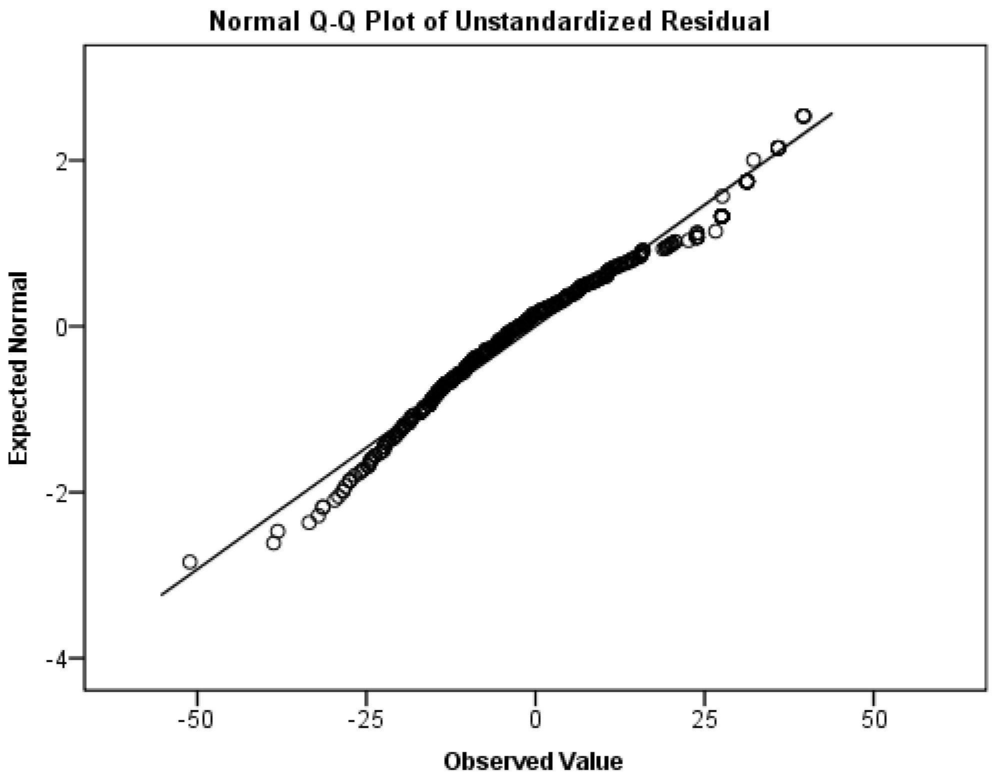

Figure 20: Normal Q-Q Plot of Unstandardized Residual - Students' 2012 Developmental Scale Scores for Mathematics

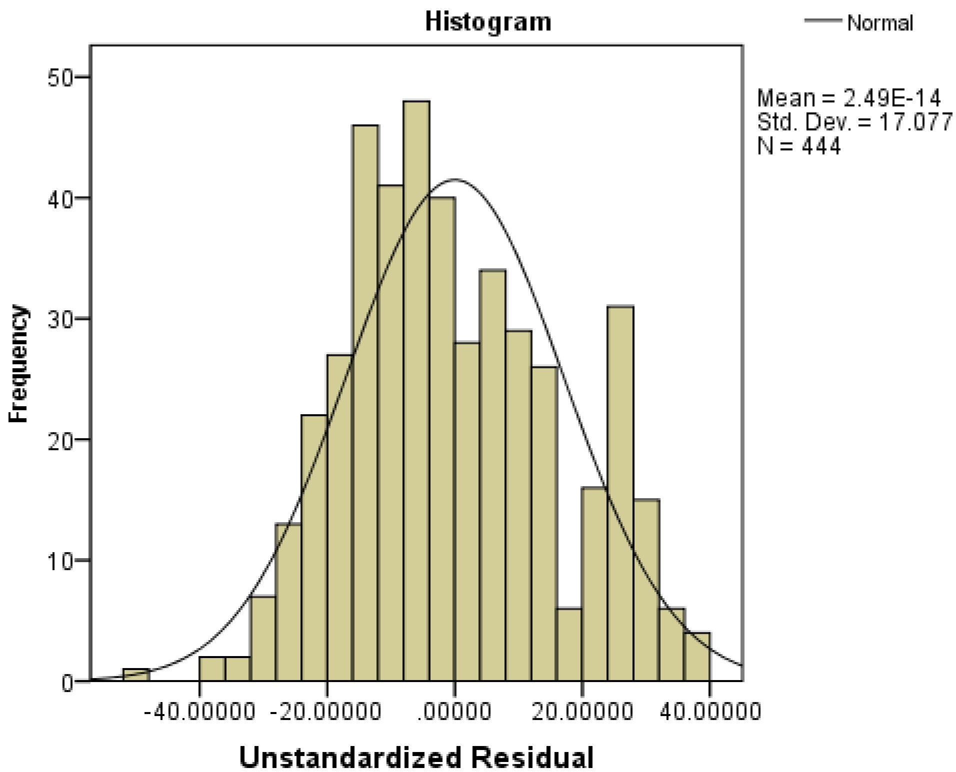

Figure 21: Histogram of Unstandardized Residual - Students' 2012 Developmental Scale Scores for Mathematics

While it was difficult to determine with binary independent variables, the assumption of independence was met because the scatterplot of studentized residuals to unstandardized predicted DSS did not appear inappropriate. This is also true for homogeneity of variance. The scatterplot of studentized residuals to predicted values did not appear to be inappropriate; this suggested homogeneity of variance. Finally, there was no problem with multicollinearity. Tolerance was greater than .10 (.99), variance inflation factor was less than 10 (1.01), there were not multiple eigenvalues close to zero (3.10, .56, .31, .04), and the condition indices were smaller than 15 (9.29). Table 7 shows a summary of the results for each of the separate analyses in block format.

Table 7

Summary of Hierarchical Regression Analysis for Demographic and Class Factors Predicting 2012 FCAT Math DSS (N = 444)

	Model 1			Model 2			Model 3		
Variable	*B*	*SE B*	β	*B*	*SE B*	β	*B*	*SE B*	β
Constant	225.80	1.25		229.43	1.40		236.09	3.18	
Gender	3.88	1.69	.11*	3.69	1.64	.10*	3.74	1.64	.10*
Free/Reduced Lunch				-8.75	1.67	-.24**	-8.34	1.67	-.23**
Class Structure							-7.38	3.16	-.11*
R^2		.01			.07			.08	
F for Δ in R^2		5.25*			27.56**			5.45*	

*p < .05. **p < .01.

Block 1: Gender

Gender was the first independent variable examined. At this point in the analysis gender was statistically significant F (1, 442) = 5.25, p = .02. There was practically no variation explained in DSS with R^2 = .012, indicating that less than 1.2% of the variance in mathematics scores could be explained by gender.

Block 2: Socioeconomic Status

The addition of socioeconomic status while holding gender constant yielded a statistically significant addition to the model, ΔF (1, 441) = 27.56, p < .001. A small amount (5.8%) of additional variability was explained with the addition of socioeconomic status: ΔR^2 = .058.

Block 3: Class Structure

The addition of class structure while holding gender and socioeconomic status constant yielded a statistically significant addition to the model, ΔF (1, 440) = 5.45, p = .02. There was practically no additional variability explained with the addition of class structure: ΔR^2 = .011 (1.1% additional variability explained).

Final Model:

The regression equation for predicting Mathematics DSS as a result of gender, socioeconomic status, and classroom structure is:

Mathematics DSS = 236.09 + 3.74 * (Gender) – 8.34 * (Free and Reduced Lunch)
– 7.38 * (Class Structure).

The overall model was statistically significant: F (3, 440) = 12.97, p < .001. The multiple correlation coefficient (R = .29) indicated a weak relationship between observed and model-

predicted values of the dependent variable. As shown in Table 4, the independent variables were interpreted as follows: male gender represented by a 1, and female gender by a 0; receiving free or reduced lunch represented by a 1, and not receiving free or reduced lunch represented by a 0; heterogeneous classroom structure represented by a 1, and homogeneous classroom structure represented by a 0.

Summary

The purpose of this study was to determine if a mean difference existed in mean FCAT 2.0 Reading and Mathematics DSS between third grade gifted students who learn in a homogeneous high academic learning environment and third grade gifted students who learn in a heterogeneous academic learning environment. Reviewing the statistical analyses from both the 2010-2011 and 2011-2012 school years showed that there were conflicting results. In the 2010-2011 school year the results indicated that there was a statistically significant difference in both mean reading and mathematics DSS between third grade gifted students who learn in a homogeneous high academic ability learning environment and third grade gifted students who learn in a heterogeneous academic ability learning environment. Yet the results from the 2011-2012 school year indicated that there was not enough evidence to support the claim that third grade gifted students who learn in a homogeneous high academic ability learning environment score differently on reading or mathematics standardize tests than do third grade gifted students who learn in a heterogeneous academic ability learning environment. In addition, multiple linear regression analyses were used to produce regression equations for predicting reading and mathematics achievement scores based on gender, socioeconomic status, and classroom structure. In all models the multiple correlation coefficients indicated a weak relationship between observed and model-predicted values of the dependent variable. Discussion of these findings is found in Chapter 5 following the summary of the study. Chapter 5 also presents the implications for practice, recommendations for further research and the conclusions.

CHAPTER 5
FINDINGS AND RECOMMENDATIONS

The chapter that proceeded presented the data as well as the analysis of that data. Chapter 5 consists of the research study summary followed by a discussion of the findings, implications these findings have for practice, and recommendations for further research. And finally, the conclusions are presented which represent assertions based on the findings. The intent of Chapter 5 is to furnish a clear understanding of the implications the results of this study have for classroom structure and ultimately student learning.

Summary of the Study

The purpose of this study was to determine the difference, if any, the type of classroom structure had on third grade gifted students' reading and mathematics performance on standardized tests as well as examine the extent to which third grade gifted students' reading and mathematics performance could be predicted based on classroom structure, student gender, and students' socioeconomic status. For the purpose of this study, classroom structure was described as either a homogeneous high academic ability learning environment or a heterogeneous academic ability learning environment. The intent of this study was to generate information about classroom structure to be used by school district level and school level administrators, gifted and general education teachers, and anyone else that determined policy and made educational decisions concerning the academic well-being of high academic ability learners. The desired outcome was that this information be used to establish the classroom structure that created the best learning environment for gifted students in order to maximize their academic potential.

Classroom structure had an important role in providing an environment in which challenging high interest materials, in-depth studies, and advanced cognitive activities could be provided Riska (2010). Albert Bandura's Social Cognitive Theory (SCT) recognized the influence that the environment or classroom structure had on students' behaviors and thoughts. Bandura posited that human beliefs and cognitive competencies, each developed and changed due to social influences and environmental structures (1986). There was limited current information concerning the implications of homogeneous grouping of gifted elementary students as it pertained to academic performance. Furthermore, the research that did exist provided mixed results as to which classroom structure had the potential to maximize the academic potential of the gifted learner. According to Raper (2006), in a mixed ability or heterogeneous academic ability classroom structure the academic needs of some learners were abandoned to accommodate the academic needs or ability level of the majority. If high ability or low ability students were in the minority their academic needs were sacrificed in order to accommodate the academic needs of the average academic ability majority, and thus their learning impeded, (Fiedler, Lange, & Winebrenner, 1993).

The population for this research study included 923 third grade gifted students who attended a public school in the Brevard County Public School System in either the 2010-2011 or the 2011-2012 school year. Students who attended public charter or virtual schools were not included in this study. Gifted students' reading and mathematics performance was based on students' FCAT 2.0 Reading and Mathematics Developmental Scale Scores (DSS). Mean DSS were compared based on students' classroom structure. In addition, regression results based on gender, free and reduced lunch status, and classroom structure were analyzed as a means to predict students' DSS.

The following definitive research questions guided this study:

1. To what extent, if any, is there a difference in the third grade gifted student reading achievement scores based on classroom structure (homogeneous high academic ability verses heterogeneous academic ability)?

   H_0: There is no statistically significant difference in third grade gifted student reading achievement scores based on classroom structure (homogeneous high academic ability verses heterogeneous academic ability).

2. To what extent, if any, is there a difference in the third grade gifted student mathematics achievement scores based on classroom structure (homogeneous high academic ability verses heterogeneous academic ability)?

   H_0: There is no statistically significant difference in third grade gifted student mathematics achievement scores based on classroom structure (homogeneous high academic ability verses heterogeneous academic ability).

3. To what extent can third grade gifted student reading performance be predicted by classroom structure, gender, and socioeconomic status?

   H_0: There is no relationship between reading performance and classroom structure when controlling for gender, and socioeconomic status.

4. To what extent can third grade gifted student mathematics performance be predicted by classroom structure, gender, and socioeconomic status?

H_0: There is no relationship between mathematics performance and classroom structure when controlling for gender, and socioeconomic status.

Discussion of the Findings

In this section an examination of the research results leads to a discussion of the findings as they pertain to previous research and the Social Cognitive Theory (SCT). Within the context of gifted learning, Burney (2008) pointed out that SCT reflected the interaction between student motivation, behavior, and environment. The learning environment or classroom structure, which could be both social and physical, had the capacity to provide students with many opportunities to observe, gain social support, and interact. Each of the four research questions are examined individually to determine the extent that reading and mathematics achievement of third grade gifted students differ based on classroom structure.

Research Question One

Question 1: To what extent, if any, is there a difference in the third grade gifted student reading achievement scores based on classroom structure (homogeneous high academic ability verses heterogeneous academic ability)?

The first research question prompted an independent samples t-test for each of the two school years examined in this study. The results from the 2011 FCAT 2.0 Reading independent samples t-test indicated that the reading scores of the third grade gifted students who learned in the homogeneous high ability classroom were significantly higher than the heterogeneous academic ability classroom structure. The mean difference in DSS of the sampled students who learned in the homogeneous classroom was almost 198 more than that of the heterogeneous group. Results indicated a large effect size, with approximately 14.5% of the variance in reading scores accounted for by classroom structure. In 2007, Taylor conducted a similar study to determine if academic ability grouping improved gifted and academically advance students' reading performance on the Tennessee Comprehensive State Assessment. His causal comparative study produced similar results (Taylor, 2007).

While the results from the 2012 FCAT 2.0 Reading Assessment analysis indicated that the reading scores of the third grade gifted students who learned in the homogeneous high ability classroom were higher than the heterogeneous academic ability classroom structure, they were not significantly higher. The mean difference in DSS of the sampled students who learned in the homogeneous classroom was a little less than 4 more than that of the heterogeneous group. Results indicated a small effect size, with only approximately 1.5% of the variance in reading scores accounted for by classroom structure.

In an effort to determine the reason for the difference and the decline in effect size between the two years studied, the researcher examined the student data for the students who learned in the homogeneous classroom structure to see if the same or different schools were involved in the samples for both years studied. Two out of the three schools sampled in the 2010-2011 school year were also the ones sampled in the 2011-2012 school year. The two schools sampled in both years' analyses showed a decline in FCAT 2.0 Reading and Mathematics DDS from the school year ending May 2011 to the school year ending May 2012. It was also determined that one of the two schools had for both years the same educator teaching the third grade high academic ability class. The teacher sited the following instructional differences in the 2010-2011 and the 2011-2012 school years. Because of the budget cuts in the

2010-2011 school year the third grade gifted students were not pulled out of class to receive their gifted services; instead, they remained with their teacher and received all instruction from her. However, in the 2011-2012 school year the gifted pull-out program was reinstated and the third grade gifted students were pulled out of the regular classroom one day a week to receive gifted services for the entire school day. Hence, the teacher had one day less each week of core instructional time with her gifted students. In addition, in February 2012, a student with extreme disruptive behaviors was transferred to her class, changing the dynamics of the class.

In a study, conducted by Wright, Horn, and Sanders (1997), teacher effect was the dominating factor affecting student learning gains, and while classroom context variables were not as influential on academic growth they did however play a significant role in the gifted learner's ability to make the same level of academic learning gains as the lower to average performing students. The researchers of the Wright, Horn, and Sanders study noted that the gifted learners made less learning gains than did the average to below-average ability learners, which they posited the following possible explanations for this disparity: lack of opportunity to proceed at an accelerated pace, lack of accelerated courses offered, insufficient challenging materials and resources, and a concentration of instructional delivery and facilitation geared toward average to below-average academic ability students in the heterogeneous classroom (Wright, et.al., 1997).

Research Question Two

Question 2: To what extent, if any, is there a difference in the third grade gifted student math achievement scores based on classroom structure (homogeneous high academic ability verses heterogeneous academic ability)?

The second research question also prompted an independent samples t-test for each of the two school years examined in this study. The results from the 2011 FCAT 2.0 Mathematics independent samples t-test indicated that the mathematics scores of the third grade gifted students who learned in the homogeneous high academic ability classroom were significantly higher than the students who learned in the heterogeneous academic ability classroom structure. The mean difference in DSS of the sampled students who learned in the homogeneous classroom was 166 more than that of the heterogeneous group. Results indicated a large effect size, with approximately 14% of the variance in mathematics scores accounted for by classroom structure. Showing similar results, Taylor's 2007 study found that academic ability grouping improved gifted and academically advance students' mathematics performance on the Tennessee Comprehensive State Assessment. He found that "ability grouping proved beneficial for these students" (Taylor, 2007, p. 86).

While the results from the 2012 FCAT 2.0 Mathematics independent samples t-test indicated that the reading scores of the third grade gifted students who learned in the homogeneous high academic ability classroom were higher than the reading scores of the students learning in the heterogeneous academic ability classroom structure, they were not significantly higher. The mean difference in DSS of the sampled students who learned in the homogeneous classroom was less than 8 more than that of the heterogeneous group. Results indicated a moderate effect size, with only approximately 5% of the variance in mathematics scores accounted for by classroom structure. While not significant the DSS of the students in the homogeneous high academic ability classroom were still, on average, higher.

Research Question Three

Question 3: To what extent can third grade gifted student reading performance be predicted by classroom structure, gender, and socioeconomic status?

The third research question prompted a multiple linear regression analysis for each of the two school years examined in this study. It is important to note that because 2011 and 2012 DSS were calculated on completely different scales, separate models were built for each year. The intent of this research was that the DSS be used as a general proxy for student reading performance as influenced by the variables of gender, socioeconomic status, and classroom structure. For both models, as shown in Table 4, the independent variables were represented and were interpreted as follows: male gender represented by a 1, and female gender by a 0; receiving free or reduced lunch represented by a 1, and not receiving free or reduced lunch represented by a 0; heterogeneous classroom structure represented by a 1, and homogeneous classroom structure represented by a 0.

The regression equations for predicting reading DSS as a result of gender, socioeconomic status, and classroom structure were:

> 2011 FCAT 2.0 Reading DSS = 2,019.06 – 72.84 * (Gender) – 153.64 * (Free and Reduced Lunch) – 43.97 * (Class Structure), and
>
> 2012 FCAT 2.0 Reading DSS = 235.66 – 4.04 * (Gender) – 6.92 * (Free and Reduced Lunch) – 3.42 * (Class Structure).

Both the 2011 and the 2012 overall models were statistically significant and both indicated a weak relationship between observed and model-predicted values of the dependent variable.

Historically, students who lived in poverty or had a low SES were among the most underrepresented participating in the gifted and talented programs in schools (Stormont, Stebbins, & Holliday, 2001). Compounding the lack of representation caused by low SES, family income has been shown to be one of the greatest correlates in respects to academic achievement (Rogers, 1996). According to the USDE, there were greater obstacles that hindered the education of children who lived in poverty then those who did not (1993). These financially disadvantaged children had more psychological difficulties and increased health problems as well as fewer resources, all of which affect academic performance. Gender can also play a role in the academic success of a student. Studies have shown that female students often outperformed male students on reading achievement tests. According to Becker and Forsyth (1990), in a longitudinal study spanning 10 years, it was found that males generally outperformed females in mathematics. However, the analyses performed in this longitudinal study also indicated that females outperformed males in other content areas, although at lower percentile levels (Becker, & Forsyth, 1990).

Research Question Four

Question 4: To what extent can third grade gifted student mathematics performance be predicted by classroom structure, gender, and socioeconomic status?

The fourth research question also commanded a multiple regression. Once again, because the 2011 and 2012 DSS were calculated on completely different scales, separate models were built for each year. The intent was that the DSS be used as a general proxy for student mathematics performance as influenced by the variables of gender, socioeconomic status, and classroom structure. For both models, as shown in Table 4, the independent variables were represented and were interpreted as follows: male gender represented by a 1, and female gender by a 0; receiving free or reduced lunch represented by a 1, and not receiving free or reduced lunch represented by a 0; heterogeneous classroom structure represented by a 1, and homogeneous classroom structure represented by a 0.

The regression equations for predicting mathematics DSS as a result of gender, socioeconomic status, and classroom structure were:

> 2011 FCAT 2.0 Mathematics DSS = 1970.87 – 11.95 * (Gender) – 121.59 * (Free and Reduced Lunch) – 118.07 * (Class Structure), and
>
> 2012 FCAT 2.0 Mathematics DSS = 236.09 + 3.74 * (Gender) – 8.34 * (Free and Reduced Lunch) – 7.38 * (Class Structure).

Both the 2011 and the 2012 overall models were statistically significant and both indicated a weak relationship between observed and model-predicted values of the dependent variable.

Historically, males have had a tendency to score higher in mathematics then did females (Gallagher, 1989; Altermatt & Kim, 2004). According to Olszewski-Kubilius and Turner, research carried out in the 1970s showed a consistent view of gender differences (2002). Following the gender-stereotypic socialization patterns of the time, girls were favored on verbal achievement tests and boys on mathematics achievement tests. Macoby offered this explanation for the prevailing academic differences, “Members of each sex are encouraged in, and become interested in and proficient at, the kinds of tasks that are most relevant to the roles they fill currently or are expected to fill in the future” (1966, p. 40).

Implications for Practice

Having come full circle from the time when educating America’s youth involved a small town single-room school and a single teacher who was expected to differentiate lessons to the diverse academic needs of all her students, to more recently general education teachers tasked with meeting the diverse academic needs of their students. While general education teachers are not usually instructing more than one or two grade levels at a time, they are, however, facilitating learning for a more diverse range of academic capabilities due to the levels of inclusion promoted through legislation. General education teachers teaching in heterogeneous academic ability classrooms only made minimal efforts to differentiate instruction enough to meet the needs of gifted learners, even after professional development in differentiating instruction was provided (Archambault, et al., 1993; Westberg & Daoust, 2002; Reis, 2007). Most who researched and wrote about gifted education agreed that gifted students require special educational experiences that challenge their advanced cognitive abilities (Rogers 1991; Stainback & Stainback, 1996; Renzulli & Reis, 1997; Melser, 1999; Gardner, 2000; Gross, 2000; Tomlinson, 2002; Shields 2002; Westberg & Daoust, 2002; Adams & Pierce, 2004; Robinson, 1981).

The implications of this research lie in its ability to add to the body of knowledge pertinent information regarding the academic benefits of providing gifted learners with a homogeneous high academic ability classroom learning environment. The results of this study can potentially be useful to educational leaders who are trying to determine the best educational environment to provide their gifted learners. Ultimately, it is the administrator who makes the decisions that determine the type of classroom structure provided gifted and advance learners. These decisions could have long-lasting, even life changing, ramifications for gifted children, and should only be made by keeping the children's best interest in mind. In her study, Riska (2010) found that the classroom structure was the avenue through which challenging high interest materials, in-depth studies, and advanced cognitive activities could be provided. She wrote that if gifted students were to maintain their advanced cognitive capabilities, the academic curricula must be consistently challenging (Riska, 2010). These sophisticated educational opportunities describe the instructional characteristics present in a fully self-contained high academic ability classroom structure. This type of learning environment maximizes the potential for learning as well as provides the impetus for learning enjoyment (Burney, 2008). Maximizing the academic potential of all learners should be the ultimate goal of all educational leaders who make decisions concerning students' learning environment.

Recommendations for Future Research

The purpose of this study was to determine the difference, if any, the type of classroom structure had on third grade gifted students' reading and mathematics performance on standardized tests. While this study was limited to the reporting of FCAT 2.0 Mathematics and Reading DDS for third grade gifted students, any future studies should incorporate a wider range of grade levels and should also look at learning gains made by students from one year to the next. By broadening the study to cover multiple years researchers can examine how the long-term implementation of homogeneous classroom structures influences student achievement.

As this research and other research that has come before it has shown, homogeneous high academic ability classroom structures have the potential to produce higher mathematics and reading academic performance on standardized tests than do heterogeneous academic ability classroom structures. However, because this study's findings produced mixed results pertaining to the significance level of the differences in mean scores, future studies should address methods of instructional delivery to include but not be limited to the types of gifted student programs used and the effect of each on academic performance. Also, because the curriculum used to teach the gifted program varies by school and is left up to the educator teaching the program, a future study examining the academic accountability of the gifted programs' curriculum is recommended.

Furthermore, this study did not address the other variables that have been shown to affect students' academic success such as students' attitudes on learning, attendance, behavior, ethnicity, home language, learning disabilities, parental support, and teachers' educational level and expertise. A multilevel study using these other variables in addition to the ones used in this study could provide a clearer picture into what elements have the best affect on maximizing gifted learning.

Finally, one additional recommendation for future research is made. There is a need for future studies to address the high ability non-gifted students who attend class in a homogeneous high academic ability classroom environment. It would be interesting to learn if there is a difference in mean test scores and yearly learning gains between non-gifted high ability students learning in a homogeneous high academic ability classroom structure and non-gifted high ability students learning in a heterogeneous academic ability classroom structure.

Conclusion

This study's findings expanded the knowledge base established by previous researchers in the area of gifted learning as it pertains to homogeneous high academic ability classroom structures. The results of this study indicated that there could be a significant difference in gifted students' performance on standardized tests based on classroom structure.

Classroom structure has the potential to be an avenue through which challenging high interest materials and advanced cognitive activities can be provided. Homogeneous high academic ability classroom structures allows more time for these types of learning opportunities than does the heterogeneous academic ability classroom structure. This is because as Raper (2006) pointed out, in a mixed ability or heterogeneous academic ability classroom structure the academic needs of some learners are abandoned to accommodate the academic needs or ability level of the majority. Furthermore, within the context of gifted learning, the Social Cognitive Theory reflects the interaction between environment, behavior, and students' motivation to learn. The homogeneous high academic ability classroom environment has the capacity to provide students with many opportunities to observe, gain social support, and interact with like ability peers. This study has confirmed the theoretical framework provided by the Social Cognitive Theory and has presented information that can empower educational leaders to make responsible decision concerning the learning environments they provide for gifted students.

APPENDIX A
IRB REVIEW

University of Central Florida

University of Central Florida Institutional Review Board
Office of Research & Commercialization
12201 Research Parkway, Suite 501
Orlando, Florida 32826-3246
Telephone: 407-823-2901, 407-882-2012 or 407-882-2276
www.research.ucf.edu/compliance/irb.html

From : **UCF Institutional Review Board #1**
FWA00000351, IRB00001138

To : **Julie A. Cady**

Date : **July 17, 2012**

Dear Researcher:

On 7/17/2012 the IRB determined that the following proposed activity is not human research as defined by DHHS regulations at 45 CFR 46 or FDA regulations at 21 CFR 50/56:

Type of Review:	Not Human Research Determination
Project Title:	The Implications of a High Academic Ability Learning Environment on Third Grade Gifted Students' Academic Achievement in Florida Public Schools
Investigator:	Julie A Cady
IRB ID:	SBE-12-08562
Funding Agency:	
Grant Title:	
Research ID:	N/A

University of Central Florida IRB review and approval is not required. This determination applies only to the activities described in the IRB submission and does not apply should any changes be made. If changes are to be made and there are questions about whether these activities are research involving human subjects, please contact the IRB office to discuss the proposed changes.

On behalf of Sophia Dziegielewski, Ph.D., L.C.S.W., UCF IRB Chair, this letter is signed by:

Signature applied by Joanne Muratori on 07/17/2012 01:24:30 PM EDT

Joanne Muratori

IRB Coordinator

APPENDIX B
DISTRICT APPROVAL LETTER

School Board of Brevard County
2700 Judge Fran Jamieson Way Viera, FL 32940-6699
Dr. Brian Binggeli, Superintendent

School Board

August 3, 2012

Dear Ms. Cady,

Thank you for your application to conduct research in the Brevard Public Schools. This letter is official verification that your application has been accepted and approved through the Office of Accountability, Testing, & Evaluation. However, approval from this office does not obligate the principal of the schools you have selected to participate in the proposed research. Please contact the principals of the impacted schools in order to obtain their approval. Upon the completion of your research, submit your findings to our office. If we can be of further assistance, do not hesitate to contact our office.

Sincerely,

Vickie B. Hickey

Vickie B. Hickey, Resource Teacher
Office of Accountability, Testing, and Evaluation

Office of Accountability, Testing & Evaluation
Phone: (321) 633-1000 FAX: (321) 633-3465

APPENDIX C
MULTIPLE REGRESSION TESTING FOR ASSUMPTIONS SUMMARY FOR 2011 AND 2012 FCAT 2.0 READING

Table 8 *Multiple Linear Regression Testing For Assumptions Summary for 2011 and 2012 FCAT 2.0 Reading*

Category	Measure	Desired Outcome	2011 Reading	2012 Reading
Initial Outlier Check	Cook's distance	< 1	Met (max = .07)	Met (max = .05)
	Centered leverage values	< 0.5, pref.< 0.2	Met (max = .04)	Met (max = .04)
	Scatterplots	no blatant outliers	Met	Met
Linearity	General linearity	Plot of dependent vs. each independent are reasonably linear	Met: difficult to determine w/binary independent variables, but did not appear inappropriate	Met: difficult to determine w/binary independent variables, but did not appear inappropriate
	Scatterplots of studentized residuals to predicted values	mostly located within -2 and 2, no patterns	Met: difficult to determine w/binary independent variables, but did not appear inappropriate	Met: difficult to determine w/binary independent variables, but did not appear inappropriate
	Scatterplots of studentized residuals to each independent	mostly located within -2 and 2, no patterns	Met: difficult to determine w/binary independent variables, but did not appear inappropriate	Met: difficult to determine w/binary independent variables, but did not appear inappropriate
Normality	Skewness	located within -2 and 2	Met: unstandardized = .59, studentized = .59	Met: unstandardized = .32, studentized = .32
	Kurtosis	located within -2 and 2	Met: unstandardized = .65, studentized = .65	Met: unstandardized = .09, studentized = .09
	Boxplot	no identified outliers	Met; any outliers were not extreme	Met; any outliers were not extreme
	Q-Q plots	roughly follows linear pattern	Met	Met
Independence	Scatterplot of studentized residuals to all independent variables	Residuals should not increase or decrease with values of indep. var	Met: difficult to determine w/binary independent variables, but did not appear inappropriate	Met: difficult to determine w/binary independent variables, but did not appear inappropriate
	Scatterplot of studentized residuals to unstandardized predicted Y	Residuals should not increase or decrease with values of predicted dependent. var	Met: difficult to determine w/binary independent variables, but did not appear inappropriate	Met: difficult to determine w/binary independent variables, but did not appear inappropriate
Homogeneity of Variance	Scatterplot of studentized residuals to predicted values	Spread should be even	Met: difficult to determine w/binary independent variables, but did not appear inappropriate	Met: difficult to determine w/binary independent variables, but did not appear inappropriate
Multicollinearity	Tolerance	greater than .10	Met: minimum was .97	Met: minimum = .99
	Variance Inflation Factor (VIF)	less than 10	Met: maximum was 1.03	Met: maximum was 1.01
	Eigenvalues	not multiple close to zero	Met (3.11, .56, .30, .03)	Met (3.10, .56, .31, .03)
	Condition Indices	Smaller than 15 (preferably) or 30 (otherwise)	Met: maximum was 9.70	Met: maximum was 9.29

APPENDIX D
MULTIPLE REGRESSION TESTING FOR ASSUMPTIONS SUMMARY FOR 2011 AND 2012 FCAT 2.0 MATHEMATICS

Table 9 *Multiple Linear Regression Testing For Assumptions Summary for 2011 and 2012 FCAT 2.0 Mathematics*

Category	Measure	Desired Outcome	2011 Math	2012 Math
Initial Outlier Check	Cook's distance	< 1	Met (max = .03)	Met (max = .04)
	Centered leverage values	< 0.5, pref.< 0.2	Met (max = .04)	Met (max = .04)
	Scatterplots	no blatant outliers	Met	Met
Linearity	General linearity	Plot of dependent vs. each independent are reasonably linear	Met: difficult to determine w/binary independent variables, but did not appear inappropriate	Met: difficult to determine w/binary independent variables, but did not appear inappropriate
	Scatterplots of studentized residuals to predicted values	mostly located within -2 and 2, no patterns	Met: difficult to determine w/binary independent variables, but did not appear inappropriate	Met: difficult to determine w/binary independent variables, but did not appear inappropriate
	Scatterplots of studentized residuals to each independent	mostly located within -2 and 2, no patterns	Met: difficult to determine w/binary independent variables, but did not appear inappropriate	Met: difficult to determine w/binary independent variables, but did not appear inappropriate
Normality	Skewness	located within -2 and 2	Met: unstandardized = .32, studentized = .32	Met: unstandardized = .31, studentized = .31
	Kurtosis	located within -2 and 2	Met: unstandardized = -.23, studentized = -.23	Met: unstandardized = -.52, studentized = -.52
	Boxplot	no identified outliers	Met; any outliers were not extreme	Met; any outliers were not extreme
	Q-Q plots	roughly follows linear pattern	Met	Met
Independence	Scatterplot of studentized residuals to all independent variables	Residuals should not increase or decrease with values of indep. var	Met: difficult to determine w/binary independent variables, but did not appear inappropriate	Met: difficult to determine w/binary independent variables, but did not appear inappropriate
	Scatterplot of studentized residuals to unstandardized predicted Y	Residuals should not increase or decrease with values of predicted dependent. var	Met: difficult to determine w/binary independent variables, but did not appear inappropriate	Met: difficult to determine w/binary independent variables, but did not appear inappropriate
Homogeneity of Variance	Scatterplot of studentized residuals to predicted values	Spread should be even	Met: difficult to determine w/binary independent variables, but did not appear inappropriate	Met: difficult to determine w/binary independent variables, but did not appear inappropriate
Multicollinearity	Tolerance	greater than .10	Met: minimum was .97	Met: minimum = .99
	Variance Inflation Factor (VIF)	less than 10	Met: maximum was 1.03	Met: maximum was 1.01
	Eigenvalues	not multiple close to zero	Met (3.11, .56, .30, .03)	Met (3.10, .56, .31, .03)
	Condition Indices	Smaller than 15 (preferably) or 30 (otherwise)	Met: maximum was 9.72	Met: maximum was 9.29

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