EFFECTS OF DEPARTMENTALIZED VERSUS TRADITIONAL SETTINGS ON
FIFTH GRADERS' MATH AND READING ACHIEVEMENT

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Effects of Departmentalized Versus Traditional Settings
on Fifth Graders’ Math and Reading Achievement

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ABSTRACT

Connie Yearwood. EFFECTS OF DEPARTMENTALIZED VERSUS TRADITIONAL SETTINGS ON FIFTH GRADERS' MATH AND READING ACHIEVEMENT. (under the direction of Dr. Sharon Michael-Chadwell) School of Education, Liberty University, July, 2011.

The purpose of this quantitative study was to determine whether fifth grade students who received instruction in a departmentalized setting achieved higher mean scale scores on the reading and math sections of the Georgia Criterion Referenced Competency Test (CRCT) than students who were taught in a traditional setting. Two one-way between-groups analyses of covariance were conducted to control for previous achievement while seeking to determine if a statistically significant difference existed in the mean reading and math scale scores of fifth grade students who were taught in different organizational structures. The findings suggest that students who received instruction in departmentalized settings scored higher on the reading and math portions of the 2010 CRCT.

Descriptors: organizational structure, departmentalization, traditional setting, instructional setting, student achievement, content specialist, reading achievement, math achievement
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List of Abbreviations

Analysis of Covariance (ANCOVA)
Analysis of Variance (ANOVA)
Adequate Yearly Progress (AYP)
Georgia Criterion-Referenced Competency Test (CRCT)
Does Not Meet the Standard (DNM)
Exceeds the Standard (E)
Economically Disadvantaged (ED)
Early Intervention Program (EIP)
English Language Arts Standard Fifth Grade Reading First Element (EL5R1)
English Language Arts Standard Fifth Grade Reading Second Element (ELA5R2)
English Language Arts Standard Fifth Grade Reading Third Element (ELA5R3)
English Language Arts Standard Fifth Grade Reading Fourth Element (ELA5R4)
Elementary and Secondary Education Act (ESEA)
Georgia Governor’s Office of Student Achievement (GAOSA)
Georgia Performance Standards (GPS)
Institutional Review Board (IRB)
Limited English Proficient (LEP)
Meets the Standard (M)
No Child Left Behind (NCLB)
Normally Identically Distributed (NID)
National Council for Teachers of Mathematics (NCTM)
Pennsylvania Educational Quality Assessment (EQA)
Regional Educational Service Agency (RESA)
Response to Intervention (RTI)
Standard Error of Measurement (SEM)
Statistical Package for Social Sciences (SPSS)
Student with a Disability (SWD)
U. S. A. Department of Education (USDOE)
Zone of Proximal Development (ZPD)
CHAPTER ONE: INTRODUCTION

Legislation of the past several decades has led to education reform in the United States. In 2002, President Bush signed the No Child Left Behind Act (NCLB) with the ultimate goal of “steady academic gains until all students can read and do math at or above grade level, closing for good the nation’s achievement gap between disadvantaged and minority students and their peers” (USDOE, 2007, p. 1). The legislation reauthorized the Elementary and Secondary Education Act (ESEA) of 1965 that provided funding for instructional technology, mathematics, and science instruction. NCLB expanded ESEA to hold states responsible for creating an accountability system to include annual assessments of students driven by measurable goals for the purpose of achieving adequate yearly progress (AYP) (USDOE, 2003). Among other mandates for increasing student achievement, NCLB called for a highly qualified teacher in the core subjects in every classroom. To be deemed highly qualified, teachers must have a bachelor’s degree, full state certification or licensure, and prove they know each subject they teach (USDOE, 2004, p. 2).

NCLB mandates highly qualified teacher status (No Child Left Behind [NCLB], 2001), but expecting elementary teachers to have the specialized knowledge to facilitate mathematics instruction, as well as knowledge for every other subject they teach is unrealistic (Reys & Fennell, 2003). The traditional organizational structure of elementary schools requires the teacher to act as a generalist, carrying responsibility for the curriculum all day (Andrews, 2006; Chang, Munoz, & Koshewa, 2008; Gerretson, Bosnick, & Schofield, 2008; Hampton, 2007; Hood, 2010; McGrath & Rust, 2002); therefore, questioning the organizational structure traditionally used in elementary
schools could possibly result in a viable option where teachers can specialize in content areas and deliver quality instruction in fewer areas (Gerretson et al., 2008). When teachers focus on their area of strength, they have more time to spend refining lessons, carefully constructing learning opportunities, and collaborating with peers instead of preparing lessons in multiple areas (Andrews, 2006; Becker, 1987; Chang et al., 2008; Dropsey, 2004; Gerretson, et al., 2008).

Creating an environment where teachers teach fewer subjects requires the examination of organizational structure in schools. Before making decisions about implementing alternative organizational structures at the elementary level, educators should seek to determine whether the practice makes a difference in student achievement. When educators seek research-based evidence on the effectiveness of various organizational structures, they find limited and often contradictory research (Chang et al., 2008; Dropsey, 2004; ERIC, 1970; Hood, 2010; Hampton, 2007; Jarvis, 1969; McGrath & Rust, 2002; Moore 2008; Reys & Fennell, 2003). The purpose of the current study is to determine whether students who received instruction in departmentalized settings achieve at a higher rate than students who received instruction in traditional settings.

In addition to the introduction of the study, chapter 1 provides background information about organizational structure. Problem and purpose statements are included to explain the objective of the study. The significance of the study is explained, and a brief overview of the quantitative research design is included with research questions and hypotheses clearly stated. Variables, limitations, and assumptions are also defined.


Background

The purpose of public schools is to educate and prepare students to be productive citizens who can positively contribute to society (Peterson, 2009). The first consideration of any school is to meet the needs of children (Sowers, 1968). With so great a responsibility, educational programs and practices undergo scrutiny to determine areas where improvement is necessary; one possible area is curriculum, the learning experiences of students in the school setting (Baker, 1999). One important factor impacting curriculum is organization of learning experiences (Baker, 1999).

Teachers spend a majority of their time devoted to lesson preparation, group instruction, and evaluation, traditional organizational structures limit teachers’ opportunities to interact with students and interfere with teachers’ attention to students’ individual learning problems (Baker, 1999). Alternative organizational structures exist, and researchers have studied their effectiveness (Becker, 1987; Braddock, Wu & McPartland, 1988; Chan & Jarman, 2004; Chang et al., 2008; Delviscio & Muffs, 2007; Dropsey, 2004; Gerretson et al., 2008; Hampton, 2007; McGrath & Rust, 2002; Moore, 2008; Page, 2009; Williams, 2009). Considering students in public schools today are our future leaders, researchers should evaluate organizational structures for the purpose of determining their impact on student achievement.

Problem Statement

NCLB (2001) mandates highly qualified status of all teachers in core content areas, but traditional organizational structure requires teachers to serve as generalists instead of content specialists (Andrews, 2006; Chang et al., 2008; Gerretson et al., 2008; Hampton, 2007; Hood, 2010; McGrath & Rust, 2002). Curriculum at the fifth grade level
in Georgia encompasses many content areas and contains multiple performance standards as mandated by the Georgia Department of Education in the state’s curriculum, the Georgia Performance Standards (GPS). If conclusive evidence to support departmentalization of elementary schools existed, administrators and teachers could make an informed decision about implementing this practice to reduce the number of courses taught while simultaneously increasing student achievement. A review of relevant literature fails to provide conclusive evidence that one organizational structure is more effective than the other, and little empirical research on the issue has been conducted (Becker, 1987; Chang et al., 2008; Contreras, 2009; Dropsey, 2004; Hampton, 2007; Harris, 1996; Hood, 2010; Lamme, 1976; Page, 2009). Researchers (Alspaugh, 1998; Becker, 1987; Braddock et al., 1988; Contreras, 2009; Chang et al., 2008; Hood, 2010; McGrath & Rust, 2002; Page, 2009; Reed, 2002) call for further study of the direct relationship between student achievement and organizational structure. Moore (2008) writes, “There is clearly a need for more empirical evidence for achievement outcomes related to organizational classroom structures, particularly the relationship between self-contained and departmentalized arrangement” (p. 48).

**Purpose Statement**

The purpose of this quantitative study was to determine if there was a statistically significant difference in the reading and math achievement of fifth grade students who were taught in departmentalized settings as opposed to fifth grade students who received instruction in traditional settings as measured by the 2010 reading and math scale scores on the Georgia Criterion Referenced Competency Test (CRCT). Understanding whether student achievement increases based on academic setting can be used to assist
administrators and educators as they strive to create quality learning environments conducive to maximum student achievement. This quantitative study implemented a causal-comparative design to investigate possible cause-and-effect relationships between two different types of organizational structure (traditional and departmentalized) and student achievement. Quantitative methods involve the process of collecting, analyzing, interpreting, and writing the results of a study (Creswell, 2003). This design was justified further because the researcher could not manipulate the independent variables, traditional and departmentalized classroom settings.

The comparison groups for the current study were comprised of students who received instruction in either a departmentalized or a traditional setting in fifth grade. Fifth grade students from classrooms from 29 elementary schools in northeast Georgia served as the convenience sample for the study. Because the researcher could not manipulate the independent variable in order to observe its effect on the dependent variable, the researcher formed groups by a selection process. This process included surveying administrators to determine the type of organizational structure used in their schools. The researcher implemented a causal-comparative design in the current study to analyze mean 2010 reading and math CRCT scale scores of fifth grade students who were taught in classrooms where different organizational structures were implemented. Demographics of the schools were analyzed to determine discrepancies in sample characteristics. Similarities and differences between the comparison groups are reported in chapter 4.
Significance of the Study

The results of this study could potentially help educational administrators determine if departmentalization of upper elementary grades is a viable option for consideration when seeking ways to improve student achievement. This study could be replicated in other settings to determine if a difference exists in the achievement scores of students who are taught in classrooms where non-traditional organizational structures are used. The results of the current study could potentially be used to make decisions about scheduling and teacher assignment.

Garretson et al. (2008) indicated a benefit of teacher specialization in departmentalized settings was the empowerment of teachers to provide more effective classroom instruction. If more effective classroom instruction is provided to students, these students will be more likely to succeed and master the content objectives (Gerretson et al., 2008). The current study could potentially provide information about departmentalization that might be useful when seeking to improve instructional design and delivery.

Georgia meets NCLB’s “highly qualified” mandate by requiring all elementary teachers who teach core academic subjects, including reading and math, to meet specific content or testing requirements for each core academic subject they teach (Georgia Professional Standards Commission, 2010). The study could potentially be used to examine the effectiveness of employing teachers as content specialists. When the concept of varying organizational structure to meet students’ needs was beginning to be debated, Findley (1967) reminded administrators to consider individual differences of faculty members and their competency in various content areas when making decisions.
about teacher placement or organizational structure. Utilizing fifth grade teachers as content specialists could create a departmentalized setting, thereby reducing the number of subjects taught (Chang et al., 2008; Dropsey, 2004). This structure could allow teachers to narrow their focus into specific content areas and fulfill NCLB’s highly qualified teacher mandate.

**Research Questions and Hypotheses**

Previous research failed to isolate the effects of organizational structure on academic achievement (Alspaugh, 1998; Alspaugh & Harting, 1995; Becker, 1987; Braddock et al., 1988; Contreras, 2009; Des Moines Public Schools, 1989; ERIC, 1970; Hampton, 2007; Hood, 2010; Jackson, 1953; McPartland, 1987; Morrison, 1968; Page, 2009). The current study examines mean achievement scores of students who were taught in different organizational structures. This quantitative study analyzed mean reading and math scale scores from the 2010 administration of the CRCT to answer the following research questions:

Research Question #1: Is there a difference in fifth grade mean reading achievement scale scores on the 2010 CRCT among students who received instruction in departmentalized settings as opposed to those who received instruction in traditional settings?

Hypothesis #1: There is a statistically significant difference in students’ fifth grade mean reading achievement scale scores as measured by the 2010 CRCT based on organizational structure (traditional vs. departmentalized) when 2008 reading CRCT scores are used as a covariate.
Null Hypothesis 1- $H_{01}$: There is no statistically significant difference in students’ fifth grade mean reading achievement scale scores as measured by the 2010 CRCT based on organizational structure (traditional vs. departmentalized) when 2008 reading CRCT scores are used as a covariate.

Research Question #2: Is there a difference in fifth grade mean math achievement scale scores on the 2010 CRCT among students who received instruction in departmentalized settings as opposed to those who received instruction in traditional settings?

Hypothesis #2: There is a statistically significant difference in students’ fifth grade mean math achievement scale scores as measured by the 2010 CRCT based on organizational structure (traditional vs. departmentalized) when 2008 math CRCT scores are used as a covariate.

Null Hypothesis 2- $H_{02}$: There is no statistically significant difference in students’ fifth grade mean math achievement scale scores as measured by the 2010 CRCT based on organizational structure (traditional vs. departmentalized) when 2008 math CRCT scores are used as a covariate.

Identification of Variables

For the purpose of this study, the terms departmentalized and traditional classroom structures were identified using concepts agreed upon by researchers and authors of current literature. In the departmentalized setting, teachers teach in their area of specialization and students move from one classroom to another for instruction. In this setting students have more than one teacher for core subjects and each teacher is responsible for a specific subject or group of subjects (Chan & Jarman, 2004; Chang et
al., 2008; Contreras, 2009; Delviscio & Muffs, 2007; Des Moines Public Schools, 1989; Dropsey, 2004; Hampton, 2007; Hood, 2009; McGrath & Rust, 2002; McPartland, 1987; Moore, 2008; Parkay & Stanford, 2007). There are many variations of the departmentalized setting, but it is agreed upon that a traditional classroom setting is one where a single teacher is responsible for all core content areas for a particular group of students for the entire school year (Chan & Jarman, 2004; Chang et al., 2008; Dropsey, 2004; Gerretson et al., 2008; Hood, 2010; McGrath & Rust, 2002; McPartland, 1987; Moore, 2008; Reys & Fennell, 2003; Sowers, 1968).

Reading achievement as measured by the Georgia CRCT was the first dependent variable in the study. Math achievement as measured by the Georgia CRCT was the second dependent variable. All fifth grade students in Georgia take the CRCT each spring. The CRCT measures what is taught in Georgia public schools at each specific grade level (Georgia Department of Education, 2010b). The primary purpose of the CRCT is to provide a valid measure of the quality of educational services provided throughout the state (Georgia Department of Education, 2011).

Organizational structure was the independent variable, and it had two levels: departmentalized and traditional settings. For the purpose of this study, organizational structure was defined as traditional where students were taught by one teacher for all content areas or departmentalized where students received instruction from multiple content area specialists.

Assumptions and Limitations

Assumptions. It was assumed that elementary schools in the Pioneer Rural Educational Service Agency (RESA) district used various organizational structures in
fifth grade. It was assumed that schools that participated in the study employed teachers who were highly qualified to teach reading and math. It was also assumed that all elementary schools in the district participated in the 2010 administration of the CRCT. It was assumed that all schools participating in the study followed standardized administration procedures for the 2010 CRCT. It was also assumed that the administrators from these elementary schools would agree to participate in the study. The researcher assumed that Pioneer RESA would cooperate by providing access to data and support as necessary.

Limitations. Limitations in causal-comparative design include lack of randomization, manipulation, and control (Gay, Mills, & Airasian, 2009). Data from only one grade level was analyzed; therefore, the results of this study may not be generalized to other grade levels. Instructional strategies used by teachers were not considered in the study. The teachers’ experience or effectiveness was not considered. Specialized teacher training or professional development in specific content areas was not considered. Limitations are further addressed in chapter 3.

Research Plan

This ex-post facto study used a causal-comparative design. This design was appropriate because the research was a non-experimental investigation in which possible cause-and-effect relationships were identified by forming groups of individuals in whom the independent variable is present or absent and then determining whether the groups differed on the dependent variable (Gall, Gall, & Borg, 2007). This research design was justified further because it was not possible to manipulate the independent variables, traditional and departmentalized settings.
The 2010 reading and math CRCT mean scale scores of students who were taught in a departmentalized setting in fifth grade were compared with those of students who were taught in a traditional setting to determine the relationship between the independent variables (traditional and departmentalized settings) and the dependent variables (reading and math achievement). The first step when analyzing the data was to conduct an exploratory data analysis and compute descriptive statistics for reading and math CRCT scores for each comparison group. Group A consisted of fifth grade students who were taught in a departmentalized setting during the 2009-2010 school year. Group B consisted of students who were taught in a traditional setting during the school year 2009-2010.

Parametric statistics utilizing analysis of covariance (ANCOVA) were conducted using 2010 reading and math CRCT achievement scores to determine whether the mean achievement scale scores of the two subgroups significantly differed. ANCOVA is a merger of ANOVA, analysis of variance, and regression for continuous variables. Analysis of covariance is used to test the main and interaction effects of categorical variables on a continuous dependent variable, controlling for the effects of selected other variables, which co-vary with the dependent variable (Gall et al., 2007; Leedy & Ormrod, 2010). Analysis of covariance is used in causal-comparative and experimental studies (Gay et al., 2009). Utilizing analysis of covariance was appropriate for the current study because the objective was to reduce the confounding influence of group differences. To control for previous achievement, participants’ 2008 reading and math CRCT achievement scores served as covariates in the current study. Analysis of covariance was appropriate because the goal of the study was to determine the effect of the independent
variable while controlling for previous achievement. By using ANCOVA, groups were equalized with respect to the control variable and then compared (Gay et al., 2009).

**Summary**

Organizational structure that is traditionally implemented in public schools requires teachers to serve as generalists (Andrews, 2006; Chang et al., 2008; Gerretson et al., 2008; Hampton, 2007; Hood, 2010; McGrath & Rust, 2002). NCLB mandated highly qualified teacher status of all teachers in core content areas, which requires them to be content specialists for multiple subjects. Creating an environment where teachers teach fewer subjects requires reorganization of traditional structure.

Organizational structures have been examined for decades. Studies on this topic have been conducted, and their results are conflicting. Researchers have called for further study of organizational structure and its impact on student achievement (Alspaugh, 1998; Becker, 1987; Braddock et al., 1988; Chang et al., Contreras, 2009; 2008; Hood, 2010; McGrath & Rust, 2002; Moore, 2008; Page, 2009; Reed, 2002).

The current quantitative study implemented a causal-comparative design to investigate possible cause-and-effect relationships between two different types of organizational structure (traditional and departmentalized) and student achievement. The current study is relevant because it examined the difference in mean reading and math achievement scores of students who received instruction in different organizational structures.

Chapter 2 contains an overview of the current study’s theoretical framework as well as a review of pertinent literature. Theoretical frameworks examined include Piaget’s constructivism theory and Vygotsky’s socio-culture and social constructivist
theories. The literature review includes literature on student achievement, organizational structure, reading development, and math development.
CHAPTER TWO: LITERATURE REVIEW

Introduction

Teachers who teach in traditional settings at the elementary level are required to be highly qualified in all core content areas they teach (NCLB, 2001). When the traditional organizational structure is modified to include the use of content specialists, teachers provide instruction in fewer content areas (Garretson et al, 2008). The current study examined whether a difference in student achievement existed based on organizational setting as measured by the 2010 CRCT. The researcher implement a causal-comparative design in current quantitative study to determine if a statistically significant difference existed in the mean reading and math achievement of fifth grade students who received instruction in a departmentalized setting as opposed to those who were taught in a traditional setting.

The literature review includes literature on student achievement, organizational structure, reading development, and math development. At the outset of the search for literature on organizational structure and its impact on reading and math achievement, Boolean keyword searches were conducted of peer-reviewed literature available from online databases using general search terms including organizational structure, departmentalization, instructional setting, traditional setting, reading achievement, math achievement, and elementary in various combinations. The researcher located a plethora of articles on the aforementioned terms. Many of the articles were not relevant to the current study. In an effort to narrow search results to include literature relevant to the goal of the current study, the researcher conducted a more focused search modifying the combination of the aforementioned keywords. A return of limited results indicated a gap
in literature relating to organizational structure implemented in elementary schools related to reading and math achievement. Table 1 highlights the outcomes of these Boolean searches.
Table 1

*Research Database Search Results of Boolean Phrases*

<table>
<thead>
<tr>
<th>Boolean Phrase</th>
<th>Database Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>Organizational structure and elementary</td>
<td>168 27 33</td>
</tr>
<tr>
<td>Departmentalization and elementary</td>
<td>21 0 1</td>
</tr>
<tr>
<td>Traditional setting and elementary</td>
<td>30 1 16</td>
</tr>
<tr>
<td>Instructional setting and elementary</td>
<td>35 8 28</td>
</tr>
<tr>
<td>Reading achievement and elementary</td>
<td>450 143 719</td>
</tr>
<tr>
<td>Math achievement and elementary</td>
<td>139 31 464</td>
</tr>
<tr>
<td>Organizational structure and reading achievement and elementary</td>
<td>0 0 0</td>
</tr>
<tr>
<td>Organizational structure and math achievement and elementary</td>
<td>0 0 2</td>
</tr>
<tr>
<td>Departmentalization and reading achievement and elementary</td>
<td>0 0 0</td>
</tr>
<tr>
<td>Departmentalization and math achievement and elementary</td>
<td>0 0 1</td>
</tr>
<tr>
<td>Traditional setting and reading achievement and elementary</td>
<td>0 0 1</td>
</tr>
<tr>
<td>Traditional setting and math achievement and elementary</td>
<td>0 0 2</td>
</tr>
<tr>
<td>Instructional setting and reading achievement and elementary</td>
<td>0 0 1</td>
</tr>
<tr>
<td>Instructional setting and math achievement and elementary</td>
<td>1 0 3</td>
</tr>
</tbody>
</table>

In addition to the introduction, this chapter contains an overview of the current study’s theoretical framework as well as a review of pertinent literature. Theoretical frameworks examined included Piaget’s constructivism theory and Vygotsky’s socio-culture and social constructivist theories as they relate to organizational structure in
schools. When searching for literature on organizational structures and reading and math development, the following concepts were considered:

1. The self-contained classroom better meets the needs of the whole child, resulting in superiority to the departmentalized classroom (Chang et al., 2008; Lobdell & Van Ness, 1963).

2. An important part of the total learning process is the development of personality characteristics (George & Cruse, 1973).

3. Teaching students in groups allows them to get to know and appreciate other learners from diverse backgrounds. Careful attention to grouping strategies allow for optimal student achievement (Ediger, 1994).

4. A factor that must be considered when examining elements affecting student achievement is variability, or diversity. Designing educational programs to allow for teachers to teach in specialized content areas provides the best quality instruction and learning environment possible so all students can be successful (Findley, 1967).

   Each of these concepts is grounded in Vygotsky’s (1978) socio-cultural and social constructivist theoretical frameworks and Piaget’s (1952) theory of constructivism. The literature review explains these theoretical frameworks and their implementation in school organizational structure. Figure 1 depicts the relationship between the theoretical frameworks and the research problem.
Conceptual or Theoretical Framework

The socio-cultural theory, constructivism, and the social constructivist theory were chosen as the underpinning frameworks for the research study out of a desire to link the importance of the setting in which students learn to their acquisition and development of knowledge. The theories defined herein are consistently referenced when discussions include how students construct knowledge. These theoretical frameworks are also referenced when discussing where students learn (organizational structure). These theorists’ conceptualizations of student assessment does not fit in today’s schools where accountability has given rise to high-stakes testing and standardized curriculum; however, their conceptualizations of the setting where learning takes place is relevant and the focus of the research study.

Studies on the topic of the effect of organizational structure on student achievement exist. Conflicts regarding which organizational structure best addresses the
social development of students abound. Proponents (Becker, 1987; Chang et al., 2008; Dropsey, 2004; Harris, 1996; Lobdell & Van Ness, 1963) of traditional classroom settings argue that this setting is superior because it best meets the needs of the whole child. Meeting the needs of the whole child includes the development of personality characteristics, an important part of the total learning process (Chang et al., 2008; George & Cruse, 1973). McPartland (1987) found that traditional classroom structures positively impact teacher-student relationships while sacrificing high quality instruction. If careful attention is paid to organization, instruction, and students’ social development, high quality learning opportunities can be designed in departmentalized settings (Braddock, et al., 1988; Chan & Jarman, 2004; Delviscio & Muffs, 2007; Ediger, 1994; Reed, 2002).

Fostering optimal social development among early adolescents requires the middle grades learning environment be structured to provide an appropriate balance of adult supervision and support along with meaningful opportunities for students to develop a sense of responsibility, independence, and maturity. By nature, departmentalized settings foster these qualities in students while providing meaningful instruction delivered by highly qualified teachers (Braddock et al., 1988).

Becker (1987) conducted a study of different school organizational structures and their affect on academic achievement of students of different backgrounds and abilities. The study acknowledged the necessity of balancing early adolescent students’ developing intellectual needs and their complex psychological needs (Becker, 1987). Most students in Becker’s (1987) study experienced some teaming or specialization, but 15% of the students were taught in self-contained classes. Results indicated that students from lower socioeconomic backgrounds benefited more from self-contained classroom settings than
students from high socioeconomic backgrounds. Although their research was conducted a decade apart, findings from Braddock et al. (1988) and Chang et al. (2008) concurred with Becker’s results.

**Socio-culture Theory.** The major theme of Vygotsky’s (1978) conceptualization of the socio-culture theory is that social interaction plays a fundamental role in the development of cognition. One practical implication of Vygotsky’s theory is that “learners should be provided with socially rich environments in which to explore knowledge domains with their fellow students, teachers, and outside experts” (United Nations Educational, Scientific and Cultural Organization, 2003). The socio-cultural theory is evident in organizational structures where children develop their cognitive skills in social settings. Reed (2002) posits that departmentalized settings foster increased opportunities for students to improve interpersonal skills through adapting to different teaching styles of multiple teachers.

Departmentalized settings also allow for increased interactions with peers because students are not confined to a set of peers for the entire school year. In these settings, students also have more opportunities to interact with various teachers because they are not assigned to a single teacher for all core content areas (Reed, 2002). These social interactions increase the opportunities for enhancement of students’ learning experiences (Braddock et al., 1988; Page, 2009).

**Constructivism.** Piaget (1952) developed a theory of the way construction of knowledge takes place. He called the theory “constructivism” on the premise that children construct knowledge based on interactions with their environment. Piaget believed social interaction affects the learning process, but personal experience of the
individual has the greatest influence on the construction of knowledge (Powell & Kalina, 2009). Constructivism posits that new learning is linked to prior knowledge and children’s schemas are constructed through the process of assimilation and accommodation (Wadsworth, 2004). Piaget’s (1952) proposed that new knowledge could only be constructed when the learner has external experiences that could not be assimilated into prior knowledge.

According to the theory of constructivism, new learning experiences must be accommodated resulting in reconstitution of prior knowledge (Harlow, Cummings, & Aberasturi, 2006). When considering organizational structure, the constructivist framework for learning may be best suited in traditional settings where students spend the majority of their day with the same teacher (Becker, 1987; Braddock et al., 1988; Chang et al., 2008; George & Cruse, 1973). In traditional settings, students work in groups to complete assignments and are physically, emotionally, and cognitively engaged by learning opportunities (Gray, 1997).

**Social Constructivist Theory.** The premise of the social constructivist theory is that social interaction precedes development because consciousness and cognition are the goal of socialization and social behavior (Vygotsky, 1978). Vygotsky (1978) shared many of Piaget’s (1952) assumptions about how children learn, but Vygotsky placed more emphasis on the effect of social interactions on learning; therefore, the role of an active, involved teacher is crucial. Vygotsky theorized culture gives the child the cognitive influences necessary for development.

Parents and teachers are the primary influences affecting cognitive development (Chang et al., 2008; Chen, n.d.). Based on the social constructivist theory, Vygotsky
(1978) posited that the acquisition of knowledge happens when the learner is within the zone of proximal development (ZPD), with the support of a more knowledgeable other (MKO). In the ZPD the learner can construct knowledge based on concepts they cannot understand on their own (Vygotsky, 1962). The quality of the teacher determines the pattern and rate of cognitive development (Chen, n.d.). In light of the social constructivist theory, high-quality interactions with adults promote self-regulated learning in students (Brofenbrenner, 1977; Vygotsky, 1978; Wertsch, McNamee, McLane, & Budwig, 1980). Departmentalized settings provide opportunities for students to interact with multiple content specialists who can provide quality learning opportunities (Andrews, 2006; Becker, 1987; Findley, 1967; Gerretson, et al., 2008; McPartland, 1987; Moore, 2008; Page, 2009; Sowers, 1968).

**Student Achievement**

Student achievement is the measurement of whether students know and can apply the concepts they are taught. “The single most critical issue in education is student achievement” (Rood, 1988). Student achievement is defined as a dynamic process in which the student constructs meaning by using existing knowledge and experiences to interact with the task as perceived from the nature of the information provided and the instructional context (Beyers, Perkins, & Presscisen as cited in Rood, 1988). Student achievement has always been the ultimate objective of schools, but with more accountability tied to student achievement, the way students are assessed has become the focus (Goertz & Duffy, 2003). Admittedly, the CRCT would not be the assessment instrument of choice of Vygotsky or Piaget, but the high stakes testing era fostered by
federal legislation mandates that students’ mastery of content standards be addressed in a valid and reliable way that cannot be achieved with alternative assessment methods.

Assessing Achievement. Assessing students gives teachers an understanding of what their students are learning (Danielson, 2003). Summative measurement of student achievement in Georgia is done annually with the administration of the CRCT. CRCT data are disaggregated into reports at the student, class, school, system, and state level. Data from these reports are used to assess student mastery of the GPS. Stakeholders use these reports to diagnose individual student strengths and weaknesses and to judge the quality of education provided by Georgia’s teachers (Georgia Department of Education, 2010b).

Scores for the test are expressed as performance levels, a range of scores defining a specific level of performance, as articulated in the Performance Level Descriptors. There are three performance levels for the CRCT: Exceeds the Standard (E), Meets the Standard (M), and Does Not Meet the Standard (DNM). A student who does not meet the standard achieves a scale score below 800. A student who meets the standard receives a scale score between 800-849. A student who exceeds the standard receives a score of 850 and above (Georgia Department of Education, 2010a). Detailed explanations of performance objectives at the DNM, M, and E level are provided later in the review of the literature on reading and math development.

With the passage of NCLB each state was responsible for creating an accountability system to include yearly assessments of children and measurable goals aimed at achieving adequate yearly progress. The accountability system needed to gather specific, objective data through tests aligned with the standards. Systems were to use that
data to identify strengths and weaknesses of their ability to teach students and students’
ability to master the standards. Beginning with the 2002-2003 school year, an assessment
was to be designed for the elementary, middle, and high school levels. By the 2005-2006
school year, assessments needed to be administered every year in grades three through
eight in reading and math (USDOE, 2003).

Georgia’s answer to the NCLB mandated accountability system was to amend
laws in 2001 to require the CRCT in grades one through eight in content areas of reading,
English/language arts, and math (Georgia Department of Education, n.d.). That year,
summative, end-of-year assessments in reading, English/language arts, and mathematics
were administered in grades four, six, and eight. Assessments in science and social
studies (grades three through eight) were administered for the first time in spring 2002.
Additionally, assessments in reading, English/language arts, and mathematics were
administered in grades one, two, three, five, and seven in spring 2002 (Georgia
Department of Education, 2010b).

In order to obtain the most reliable and accurate test results from younger
students, those responsible for designing Georgia’s assessment measurement looked at
how other states assessed students in the early grades and at the procedures identified by
educational research (Georgia Department of Education, 2010b). The CRCT is
specifically designed to measure how well students acquire the skills and knowledge
described in the GPS (Georgia Department of Education, 2010b); therefore, it is the most
appropriate tool for assessing student mastery of mandated curricula. The CRCT adheres
to NCLB’s accountability mandate because it (a) is based on state content and
performance standards, (b) measures higher order thinking, (c) provides useful diagnostic information, and (d) is valid and reliable (Georgia Department of Education, n.d.).

In accordance with federal requirements for state standards and assessments systems, a team of external experts reviewed the CRCT. This team was assembled by the U. S. Department of Education. The team reviewed the CRCT in the following areas: content and academic achievement standards; technical quality; alignment; inclusion; and scoring and reporting. The team that established the test meets nationally recognized professional and technical standards for assessment programs (Georgia Department of Education, 2010b).

NCLB does not mandate standardized testing, but according to Reddell (2010), “NCLB is what set the testing frenzy in the United States in motion” (p. 5). Many states are inclined to administer them to meet the federal law and avoid loss of federal funding (Au, 2011; Baker & Johnston, 2010; Supovitz, 2009). While NCLB mandates that accountability assessments measure higher-order thinking skills, opponents say standardized exams offer few opportunities for students to display their ability to analyze, synthesize, evaluate, and create (Popham, 1999; Wright, 2004). Challengers of standardized testing also express concern that results provide too little information to produce accurate or detailed results about students’ actual abilities (Popham, 1999; Project Appleseed, 2010; Reddell, 2010).

Standardized tests are summative in nature and cannot be used to inform instruction for the students it tests (Reddell, 2010; Todd, 1998). Because best-practice teaching can be jeopardized through standardized testing, one adversary opines, “Teachers are taught to anticipate what will be on the test and teach the students only that
material, leading to students having vague, if any, understanding of any other concepts they may need” (Reddell, 2010, p. 6). Au (2011) writes that using high-stakes testing practices promotes the standardization of teaching that both “disempowers and deskills teachers” (p. 30). Critics also argue that misuse of standardized tests discourages innovation, encourages teaching to low level skills, and discriminates against students from cultural minorities and those who are non-native English speakers (Au, 2011; Baker & Johnston, 2010; Pearson Education, 2010; Reddell, 2010; Walden & Kritsonis, 2008).

While critics frown upon the use of standardized tests, this form of summative assessment receives accolades from others (Klecan-Aker & Colson, 2009; Phelps, 2005; Thompson, 2009). Standardized tests use statistical analysis of student responses to provide results that are reliable and valid (Klecan-Aker & Colson, 2009; Pearson Education, 2010; Standardized Tests 101.com, 2009). According to Supovits (2009), standardized testing encourages educators to align curriculum, standards, and assessments. Tingey (2009) asserts that a positive effect of standardized testing is that data from the test provide useful information about teaching and learning and provide some accountability.

Advocates also argue that standardized tests efficiently measure academic achievement of large numbers of students (Pearson Education, 2010; Thompson, 2009, “Views On,” n.d.). Standardized tests also ensure students are measured objectively on the same material (Standardized Tests 101.com, 2009; “Views On,” n.d.).

Standardized tests can generate information about student performance, and they should be supplemented with other assessment methods that reveal deeper and more complex dimensions of students’ learning such as portfolio assessment, formative
assessment, performance tasks, and opportunities for real-world application of concepts (Danielson, 2003; Phelps, 2005; Project Appleseed, 2010; Thompson, 2009; Wright, 2004). These types of assessment instruments more closely align with the teaching and learning theories supported by Vygotsky and Piaget. Because assessment of student achievement using these methods is subjective, they do not meet the standards for accountability assessment mandated by NCLB. Georgia educators use these formative assessment methods to evaluate student achievement and to inform instruction, but are required to administer the CRCT as the ultimate measure of student achievement.

Organizational Structure

For the purpose of this study the terms *departmentalized* and *traditional* classroom structures are identified using concepts agreed upon by researchers and authors of current literature. In the departmentalized setting, teachers teach in their area of specialization and students move from one classroom to another for instruction. In this setting students have more than one teacher for core subjects and each teacher is responsible for a specific subject or group of subjects (Chan & Jarman, 2004; Chang et al., 2008; Contreras, 2009; Des Moines Public Schools, 1989; Delviscio & Muffs, 2007; Dropsey, 2004; Hampton, 2007; Hood, 2010; McGrath & Rust, 2002; McPartland, 1987; Moore, 2008; Parkay & Stanford, 2007). There are many variations of the departmentalized setting, but it is agreed upon that a traditional classroom setting is one where a single teacher is responsible for all core content areas for a particular group of students for the entire school year (Chan & Jarman, 2004; Chang et al., 2008; Dropsey, 2004; Gerretson et al., 2008; Hood, 2010; McGrath & Rust, 2002; McPartland, 1987; Moore, 2008; Reys & Fennell, 2003; Sowers, 1968).
Historical Perspectives on Organizational Structure. For decades teachers and educational administrators have implemented various organizational structures with increased student achievement as the ultimate goal (Contreras, 2009; Hood, 2010; Page, 2009). Jackson (1953) posited that departmentalized classrooms were the least desirable plan for meeting emotional needs of students. Findley (1967) suggested that departmentalization seemed to promise relief for teachers who were required to have specialized competency. Sowers (1968) provided advice on implementing the concept of team-teaching, a relatively new and innovative organizational structure for schools at the time. Morrison (1968) questioned the effectiveness of one teacher teaching all subjects. McPartland (1987) found departmentalization improved the quality of instruction teachers provided.

Reys & Fennell (2003) posited that teachers with particular knowledge and expertise in mathematics (mathematics specialists) created the best learning environment for students. Some argued that departmentalized settings better prepare students for transition to middle school (Chan & Jarman, 2004; Delviscio & Muffs, 2007). Delviscio & Muffs (2007) reported that third, fourth, and fifth grade students in a departmentalized setting showed a definite increase in standardized test scores. Schools using teachers as content specialists in team-teaching settings reported that teachers had more time to plan effective instruction and to focus their professional development efforts to concentrate on improving delivery of the content (Andrews, 2006; Becker, 1987; Gerretson, et al., 2008; Page, 2009).

Organizational structure became a focus early in the twentieth century when Briggs (as cited in Lutz, 2004) published The Junior High School and “developed a
critical analysis of the junior high school movement by conducting a review of literature,
visitations, and educator questionnaires” (Lutz, 2004, p. 3). Briggs’ work led to the
development of the modern middle school concept where students in seventh and eighth
grades were integrated into a departmentalized setting for instruction and “retained some
of the flavor, character, and content of the elementary school” (Lutz, 2004, pp. 5-6). As a
result of the common practice of departmentalization at the middle school level, many of
the studies on the effects of departmentalization focused on students in grades six through
eight (Alspaugh, 1998; Becker, 1987; Braddock et al., 1988; Contreras, 2009; Harris,
1996; McPartland, 1987; Page, 2009).

Standards-based education reform has existed for more than 20-years (National
Academy of Education, 2009). The educational standards movement of the 1980’s began
with the publication of A Nation at Risk (National Commission on Excellence in
Education, 1983). The report described the sad state of the United States educational
system. A Nation at Risk became known as the first wave of education reform because
for the first time standardization of curriculum was the focus of school improvement
efforts (Lutz, 2004).

The recommendations from A Nation at Risk focused on five specific areas: (a)
content, (b) standards and expectations, (c) time, (d) teaching, and (e) leadership and
fiscal support (National Commission on Excellence in Education, 1983). A curriculum
based on core standards and understandings had its foundational origins in the
recommendations from the A Nation at Risk report. As schools were forced to view
standardized testing results as a single measure of success, instructional philosophies
were affected (Lutz, 2004).
Although *A Nation at Risk* identified specific areas of concern and recommendations to be implemented, little change in schools was evident within the core practice of schools in the years following the report (Lutz, 2004). The decades since educational reform initiatives were mandated have been called the era of accountability because of high stakes standardized testing (Page, 2009). “During the era of accountability, schools were reformed in many different ways designed to increase student achievement as measured by their scores on standardized tests” (Page, 2009, p. 16).

In an effort to mimic the academic achievement success of middle schools, many elementary schools began to implement the departmentalized model (Andrews, 2006; Chan & Jarman, 2004; Chang et al., 2008). “The underlying reason for departmentalization today in many elementary schools is the demand to meet standards, indicators and benchmarks of the curriculum” (Dropsey, 2004, p. 4). According to Delviscio and Muffs (2007), departmentalization of upper elementary grades in the era of high stakes testing reduced “transition shock” among sixth graders when they moved from traditional settings to a fully departmentalized middle school. Departmentalization gained support at the elementary level because it helped schools meet demands of standardized testing; thus, departmentalization and the climate of high stakes testing appeared to be linked (Page, 2009).

**Literature on organizational structure.** Organizational structure as it relates to student achievement has been the topic of myriad research studies resulting in conflicting results (Hampton, 2007; Hood, 2010; Moore, 2008; Page, 2009). Previous studies found no particular organizational structure significantly impacted student achievement.
(Becker, 1987; Braddock et al., 1988; Des Moines Public Schools, 1989; ERIC, 1970; Hampton, 2007; Hood, 2010; Jackson, 1953; McPartland, 1987; Morrison, 1968; Page, 2009), while other studies on the same topic revealed statistically significant differences in student achievement based on organizational structure (Chang et al., 2008; McGrath & Rust, 2002; Moore, 2008; Williams, 2009). Recent research on organizational structure indicated conflicting outcomes in their findings to those of their predecessors; hence, there were recommendations for future studies (Alspaugh, 1998; Andrews, 2006; Chang et al., 2008; Gerretson et al., 2008; Harris, 1996; Hood, 2010; McGrath & Rust, 2002; Moore, 2008; Page, 2009; Reed, 2002).

A landmark study on departmentalization was initiated when a small group of concerned parents petitioned the Board of Directors to discontinue departmentalization at the elementary level. The study included elementary schools in twenty-four school districts from Iowa and surrounding states (Des Moines Public Schools, 1989). The survey data revealed that the degree of departmentalization increased with grade level. Principals of 41 elementary schools were asked to define the organizational structure used in their schools as well as the subjects taught by each teacher. Results of the study indicated organizational structure had little impact on student achievement. The study also found advantages and disadvantages to all organizational structures (Des Moines Public Schools, 1989). The results of the Des Moines study align with others that had similar findings (Hampton, 2007; Page, 2009).

A study conducted by McPartland (1987) for the Center for Research on Elementary & Middle Schools examined the effects of self-contained classroom instruction as opposed to departmentalization on student-teacher relations and quality of
instruction. One hypothesis of the study sought to determine if there was a single best way to organize a middle school to meet the variety of needs of early adolescent students. Four hundred thirty-three schools in Pennsylvania participated in the study.

The aforementioned study focused on two educational goals at the middle school level: high quality subject-matter instruction and positive teacher-student relations (McPartland, 1987). The primary hypothesis tested by the study was that organizational structure benefits one area while detracting from the other. McPartland (1987) theorized, “More highly departmentalized instruction will generally produce more high quality instruction but less positive teacher-student relationships, and vice versa” (p. 4).

Empirical evidence from Pennsylvania’s annual Educational Quality Assessment (EQA) was used to examine how departmentalization affected teacher-student relations and instructional quality.

McPartland (1987) found that teacher-student relationships were strong indicators of student success. It was also determined that schools using departmentalized settings showed statistically significant higher student ratings of instruction in math, social studies, and science. Students taught in self-contained settings did not rate their instruction in science and social studies as highly as schools where departmentalized settings were used. This study found there was no single best way to organize a middle school to meet the multiple educational goals for early adolescents (McPartland, 1987). These findings were supported by further studies conducted by Braddock et al., (1988) and Chang et al., (2008).

McGrath and Rust (2002) reported findings consistent with those of Garner & Rust (1992). Their study indicated that students in traditional settings gained
significantly more than their counterparts in departmentalized settings. Similarly to the Garner & Rust study, the McGrath & Rust (2002) study investigated the relationship between elementary school classroom organizational structure and standardized achievement scores, but the latter added measures for the amount of time spent on transition and instruction in departmentalized and traditional settings. The subjects of the study were 197 fifth and sixth grade students from one school district. School A contained 109 students who were taught in departmentalized settings. School B contained 87 students who were taught in self-contained settings. Analysis of variance (ANOVA) was used to analyze the effect of the independent variables (organizational structure) on the dependent variables (student achievement). While the study reported findings that agreed with the previous study, it was limited in that only one school district was included.

The purpose of a study by Gerretson, et al. (2008) was to identify factors associated with the growing use of teacher specialists in elementary schools, particularly in the area of mathematics. The study focused on the impact of traditional settings and departmentalized settings on mathematics achievement of students in elementary schools at a large metropolitan school district in northeastern Florida. Researchers found teachers who specialized in particular subject areas were empowered to provide more effective classroom instruction (Gerretson, et. al., 2008). These findings were in opposition to similar studies conducted by researchers who argued departmentalization impeded teacher-student relationships, negatively impacting instruction and student mastery of concepts (Chang et al., 2008; Braddock et al., 1988).
Still seeking to determine the relationship between departmentalization and student achievement, Moore (2008) conducted a study of fourth and fifth grade students in six different school systems in Tennessee. Moore also analyzed standardized test scores of comparison groups. Additionally, Moore sought to determine the impact of teacher preference for one form of organizational structure (departmentalized or traditional). Findings indicated no significant difference in academic achievement based on organizational structure or teacher preference in all science, social studies, math, and English language arts for fourth grade. No significant difference was found in academic achievement of fifth graders with the exception of math. Conclusions of the study were that fifth graders who were taught math in departmentalized settings scored higher than fifth graders who were taught math in traditional settings. Moore’s (2008) findings aligned with those of Gerretson et al. (2008) where a valid argument for utilizing content specialists at the elementary level was made.

Williams (2009) focused on evaluating the effect of departmentalization on the 2007 and 2008 CRCT math scores of fifth grade students from the same RESA district represented in the current study. Williams’ study was designed similarly to that of Page (2009). Each study used t-tests to compare student achievement data on standardized tests while seeking to determine whether schools that used departmentalized settings had a higher percentage of students meeting or exceeding state standards. Neither study used statistical analysis to control for previous achievement before the introduction of the independent variable; thus, findings were conflicting.

Williams (2009) indicated there was no significant difference between the percentages of students passing state mandated standardized tests in 2008 based on the
independent variable, organizational structure. Williams’ analysis of 2007 achievement data indicated a significant difference between the percentages of students passing at the meets and exceeds levels of proficiency. The departmentalized setting had a greater percentage of students passing at the exceeds level than the traditional setting. Findings of the Page (2009) study indicated that schools that did not departmentalize had higher mean scores in the advanced or proficient range.

At the time of Williams’ (2009) study, the newly introduced GPS had recently been implemented in their entirety. The current study focuses on Georgia CRCT results from 2010. The GPS is now in the third full year of implementation. Teachers are familiar with the standards, and students have been exposed to the language of the standards for several consecutive years. Unlike previous studies on the same topic, the current study utilizes ANCOVA to control for students’ previous achievement prior to the introduction of the independent variable, hence isolating its effect on student achievement.

**Reading Development**

**Developmental acquisition of reading skills.** Language development is the predecessor of reading development. Constructivists and socioculturalists have differing opinions of how reading develops. Socioculturalists stress the social dynamics of language use and reading development, whereas constructivists believe the complex rule systems and cognitive constraints governing the development of specific constructions primarily affect language and reading (Stone, Silliman, Ehren, & Apel, 2004).

In order for students to learn to read, the skills necessary for reading must be taught through systematic, organized instructional strategies (Beers, 2006). According to
Pruisner (2009), the primary focus of reading instruction is to facilitate development and growth of the reader’s knowledge base. This knowledge bases includes language development, beginning reading, and reading, which extends from elementary to secondary instruction. Beginning with prereading, the development of reading progresses in stages: (a) initial reading, (b) confirmation and fluency, (c) reading for learning, (d) multiple viewpoints, and (e) construction and reconstruction (Chall, 1976).

Prereading begins with oral language development. Initial reading includes the understanding that letters represent sounds, and that sounds combine to form spelling relationships and words (Chall, 1976). In stage two, fluency and decoding skills are practiced. From the constructivist’s view, stage two is where readers use previously learned reading skills to acquire new facts and concepts (Boyle and Scanlon, 2010). Fluent reading is a characteristic of being a good reader (Dunn, 2007). Reading fluency is one of the five major components of reading that must be included in reading instruction. Reading fluency is the ability to read accurately, quickly, effortlessly, and with appropriate expression and meaning. The goal of reading instruction is comprehension, and increased fluency allows beginning readers to transition from calling words to understanding them in context (National Reading Panel, 2000; Rasinski, 2003).

Johns and Berglund (2006) expanded the definition of fluency to include: (a) speed, (b) accuracy, (c) expression, and (d) comprehension. Speed refers to the number of words a person reads per minute. Accuracy is the number of words read with few errors. Expression is the ability of the reader to use correct phrasing, tone, and pitch while reading text aloud. Comprehension refers to the reader’s ability to understand the text being read (Johns & Berglund, 2006).
The ability to make sense of printed words is known as decoding (Chall, 1976; Reading Decoding Skills, 2005). Decoding skills encompass the understanding that spoken words are represented in letters and sounds forming phonemes. Strong decoding skills require a basic understanding of the properties of written words: (a) semantics, (b) syntax, (c) conceptual relationships, (d) phonological properties, and (e) morphological properties (Chall, 1976). Semantics is the word’s meaning. Vocabulary is a critical component in semantics. Syntax refers to an understanding of the relationships between words. Conceptual relationships refer to how words relate to each other (Reading Decoding Skills, 2005).

A reader who understands conceptual relationships in text becomes a stronger reader because he is able to construct meaning of new words based on previously learned vocabulary (Reading Decoding Skills, 2005). Phonological properties are also known as phonemic awareness, an understanding of the various sounds and blends forming the word. Morphological properties are word elements (e.g., prefixes and suffixes) creating new words and changing the meaning of the word (Reading Decoding Skills, 2005).

During stage three, reading to learn, reading development includes learning facts and concepts from printed text (Chall, 1976). In this stage reading skills are developed by the acquisition of new vocabulary. Stage three is informed by the constructivist theory because students must link new knowledge with prior knowledge to expand vocabulary (Boyle & Scanlon, 2010). Stage four of reading development, multiple viewpoints, refers to a stage when students begin to read materials written from varying perspectives on topics and issues (Chall, 1983). In this stage of development, readers
begin to critically analyze text and understand multiple points of view (Boyle & Scanlon, 2010).

The transition from stage four to stage five is the most difficult because progressing between the two stages depends upon the reader’s intelligence, knowledge base, and motivation (Chall, 1983). Stage five of reading development is a critical level which requires the reader to construct his own understanding of the text from the author’s representation of the concept. At this stage, readers are able to confidently read and understand the topic, and they are able to create new knowledge about the topic (Boyle & Scanlon, 2010).

**Reading instruction in Georgia.** Fifth grade students in Georgia expand upon the reading concepts, skills, and strategies learned in earlier grades (Georgia Department of Education, 2006). The GPS, broad statements of what students should know and be able to do in specific content areas (Georgia Department of Education, 2007), is the curriculum used by teachers. Specific learning goals are identified by elements. Standards are grouped by strands in content areas (Georgia Department of Education, 2007). Mastery of fifth grade reading standards is assessed with the CRCT (Georgia Department of Education, 2009a).

Stage two and three reading skills (semantics, syntax, conceptual relationships, phonological properties, morphological properties, and reading to learn) are taught using fifth grade English Language Arts Standard Fifth Grade Reading Third Element (ELA5R3) and English Language Arts Standard Fifth Grade Reading Fourth Element (ELA5R4) of the fifth grade GPS (Georgia Department of Education, 2006). Figure 2 provides an explanation of how to interpret a standard as it is presented in the curriculum.
Figure 2. Interpreting the GPS. ELA5R3 is the third reading standard for fifth grade English Language Arts.

Within standards ELA5R3 and ELA5R4 students are expected to be able to determine the meaning of unfamiliar words using context clues. They also learn to determine the meaning of unfamiliar words using existing knowledge of common roots, suffixes, and prefixes. Upon mastery of these standards students will be able to identify the meaning of common prefixes and identify alternate word choices. They will use letter-sound knowledge to decode words by using phonemic awareness and context clues to determine pronunciation and meaning. Fluency is also developed and increased within these standards (Georgia Department of Education, 2006).

Stage four and five reading skills (multiple viewpoints, construction, and reconstruction) are taught using English Language Arts Standard Fifth Grade Reading First Element (ELA5R1) and English Language Arts Standard Fifth Grade Reading Second Element (ELA5R2) (Georgia Department of Education, 2006). Students are taught to comprehend and explain a variety of literary and informational texts. They learn to make connections with text and to relate new information to prior knowledge. Upon mastery of these standards, students will understand that theme refers to the author’s message and read thoughtfully and purposefully. They will identify the author’s perspective and supporting details, and they will be able to analyze the effect of
figurative language. Students in fifth grade further develop their understanding of character, setting, and plot. They learn to respond to imagery when responding to literature (Georgia Department of Education, 2006).

**Assessment of Georgia students’ reading skills.** All fifth grade students in Georgia are required to take the CRCT each spring. The CRCT is designed to measure what is taught in Georgia public schools at each specific grade level (Georgia Department of Education, 2010b). The primary purpose of the CRCT is to provide a valid measure of the quality of educational services provided throughout the state (Georgia Department of Education, 2011).

Students performing at the DNM level (a scale score below 800) in reading have difficulty demonstrating comprehending what they read. Their test results do not show evidence of a warranted and responsible explanation of literary, informational, and functional texts (Georgia Department of Education, 2010a). These students’ ability to identify and analyze literary elements is minimal. Their skill in making judgments and inferences and supporting them with evidence from the text is limited. Students performing at this level may be able to cite details in informational texts, but they have difficulty synthesizing the main idea those details support. Fifth grade students performing at the DNM level may have difficulty using context, word structure, and reference materials to determine the meaning of new words. Students who do not meet the expectations of the standards may not be able to use common graphic features to evaluate functional materials, including text and media (Georgia Department of Education, 2010a).
Students performing at the M level (a scale score between 800 and 849) in reading demonstrate adequate comprehension when reading. They show evidence of a warranted and responsible explanation of literary, informational, and functional texts (Georgia Department of Education, 2010a). These students are able to recognize and infer various literary elements and techniques. Students who meet the standards’ expectations can make judgments and inferences and support them with evidence from the text. Students performing at this level can determine the main idea and supporting details in informational texts. They use common organizational and textual features in understanding texts. These students also recognize stated themes and make connections in literature. Students performing at this level use context, word structure, and reference materials to determine the meaning of new words. Fifth grade students performing at the M level are able to use common graphic features to gain understanding of functional materials, including text and media (Georgia Department of Education, 2010a).

Students who exceed on the reading test (a scale score of 850 and above) exhibit a thorough understanding of the text (Georgia Department of Education, 2010a). These students show evidence of a warranted and responsible explanation of literary, informational, and functional texts. Students exceeding expectations exhibit an in-depth understanding of how to infer and analyze various literary elements and techniques. They are able to make judgments and inferences and substantiate them with evidence from the text. Students performing at this level determine and analyze the main idea and supporting details in informational texts. These students are able to analyze organizational and textual features as an aid to understanding texts. Students who exceed on the reading test recognize both stated and implied themes in literature. Students
performing at this level employ various strategies to acquire new vocabulary, and they are able to recognize and evaluate common graphic features to enhance their understanding of functional materials, including text and media. Students who exceed expectations show evidence of a thorough understanding of grade appropriate reading concepts and skills. (Georgia Department of Education, 2010a).

**Math Development**

**Developmental acquisition of math skills.** Children between the ages of birth and four use their senses to learn about the world around them (“Children’s Development,” 2004). Math concepts acquired at this young age are the basis of students’ future ability to solve problems they face at school, home, and play. During this stage of development, the child learns the concepts of size, cause and effect relationships, classifying, predicting, rote counting, meaningful counting, identifying shapes, making cause and effect predictions, spatial relationships, ordering, sequencing and patterning, matching, comparing and contrasting, time, and measuring. These concepts are acquired as the child develops observation skills through exploration and play. (“Children’s Development,” 2004).

In elementary grades students expand on concepts learned through exploration and play. Reys & Fennell (2003) write, “In the elementary grades, students learn number skills such as computing and estimating. Students also measure two and three-dimensional objects, reason about geometric relationships, organize and analyze data, and explore basic notions of probability. They also form attitudes toward and beliefs about mathematics” (p. 278). The level at which students successfully solve problems can be defined as math maturity (Moursund, 2011). Math maturity is a student’s movement
from rote memorization to application of learned concept. Math inquisitiveness is an aspect of math maturity. A student who is math mature will ask questions and seek to expand his understanding of the concept. Math maturity, referring to a mixture of mathematical experience not directly taught, focuses on long-term understanding, retention, and ability to use the math the student has previously studied (Moursund, 2011).

Although math development depends upon a high level of abstractness, it is a vertically structured discipline. Math development requiring students to learn in a constructivist manner retaining math they have previously learned and using it to effectively learn and use the math they will encounter in the future (E. Faulkenberry & Faulkenberry, 2006). Expanding upon the constructivist theoretical framework, Piaget (1972) developed a theory of cognitive development. According to this theory, a child moves through four stages of cognitive development: (a) sensorimotor stage, (b) pre-operational stage, (c) concrete operational stage, and (d) formal operational stage.

The sensorimotor stage occurs during infancy and is based on physical interactions and experiences. Children experience the pre-operational stage when they are toddlers and in their early childhood year. In this stage children demonstrate intelligence through the use of symbols, language, memory, and imagination. In the concrete operational stage, elementary age and early adolescent children demonstrate intelligence through logical and systematic manipulation of symbols related to concrete objects. Learners are considered to be in the formal operational stage when they are adolescents and adults. They demonstrate intelligence through the logical use of symbols related to abstract concepts (Huitt & Hummel, 2003).
Cognitive math development correlates to Piaget’s cognitive development theory (Moursund, 2011). In the sensorimotor stage infants gain and display spatial sense. They use sensory and motor capabilities to explore and gain understanding of their environments. In the preoperational stage children learn to count and develop an understanding of a number line. They use speech to convey understanding. Their proficiency in counting activities increases. In the concrete operational stage, children demonstrate knowledge of numbers, length, liquids, mass, weight, area, and volume through manipulation of symbols related to concrete objects. During the formal operational stage, children think abstractly. They demonstrate knowledge of math intelligence through the logical use of symbols related to abstract concepts (Moursund, 2011).

Math development is dependent on informal and formal education from parents, teachers, and more knowledgeable others (Devlin, 2000); hence, it is also rooted in Vygotsky’s (1978) social constructivist theory. Math maturity steadily increases over time through the increase of cognitive development, learning math in an environment conducive to mastery of math concepts, and working with more knowledgeable others who have a higher level of math maturity (Moursund, 2011).

The National Council of Teachers of Mathematics (NCTM, 2000) developed a set of mathematics standards that serve as a guide for all those who make decisions affecting the mathematics education of students in prekindergarten through grade 12. The standards are descriptions of what mathematics instruction should enable students to know and do. The standards are divided into two categories: content standards and process standards. Content standards describe the content students should learn: (a)
number and operations, (b) algebra, (c) geometry, (d) measurement, and (e) data analysis and probability. The process standards emphasize ways of acquiring and using content knowledge: (a) problem solving, (b) reasoning and proof, (c) communication, (d) connections, and (e) representation.

Content standards should receive different emphases across grade levels with number and operations receiving greatest emphasis in prekindergarten through second grade (NCTM, 2000). Number sense is the foundational understanding of numbers and operations. It involves the ability to think and work with numbers easily and to understand their uses and relationships. Children utilize number sense to count, add, and subtract. These skills are the foundation of all mathematic skills and procedures (U. S. Department of Education, 1999). Early number sense generally revolves around children’s knowledge of numbers and quantities and is acquired before they begin formal schooling (LeFevre et al., 2010).

Process standards should be equally emphasized across all grade levels. Children use problem-solving skills to do all aspects of mathematics (U. S. Department of Education, 1999). They use reasoning, a major component of problem solving, to think through a problem and come up with an appropriate answer. Communication is crucial as children learn to represent ideas with words, diagrams, pictures, and symbols. When children make connections between mathematics and other subjects or things they do in the real world every day, their math intelligence and capacity to understand mathematical concepts increases (U. S. Department of Education, 1999).

Math instruction in Georgia. Fifth grade teachers in Georgia are required to use the GPS for teaching math. Content domains include number and operations,
measurement, geometry, algebra, and data analysis and probability, and process skills. Within these content domains there are descriptions of what a student should be able to do at the beginning of each grade level. Process standards emphasize problem solving, reasoning, representation, connections, and communication (Georgia Department of Education, 2008). Process standards require active engagements of students in math-related learning experiences so that knowledge and procedural skills can be developed. Students in fifth grade maintain skills and concepts learned in earlier grades while further developing their understanding of multiplication and division of whole numbers, decimals, and fractions (Georgia Department of Education, 2008). Figures 3-8 provide an overview of the fifth grade math GPS curriculum in specific strands.
## 5th Grade Math Standard
Numbers and Operations (M5N)

1. **Students will further develop their understanding of whole numbers.**
   - **Element:**
     - a. Classify the set of counting numbers into subsets with distinguishing characteristics (odd/even, prime/composite).
     - b. Find multiples and factors.
     - c. Analyze and use divisibility rules

2. **Students will further develop their understanding of decimal fractions as part of the base-ten number system.**
   - **Element:**
     - a. Understand place value.
     - b. Analyze the effect on the product when a number is multiplied by 10, 100, 1000, 0.1, and 0.01.
     - c. Use <, >, or = to compare decimals and justify the comparison.

3. **Students will further develop their understanding of the meaning of multiplication and division with decimal fractions and use them.**
   - **Element:**
     - a. Model multiplication and division of decimal fractions by another decimal fraction.
     - b. Explain the process of multiplication and division, including situations in which the multiplier and divisor are both whole numbers and decimal fractions.
     - c. Multiply and divide with decimal fractions including decimal fractions less than one and greater than one.
     - d. Understand the relationships and rules for multiplication and division of whole numbers also apply to decimal fractions.

4. **Students will continue to develop their understanding of the meaning of common fractions and compute with them.**
   - **Element:**
     - a. Understand division of whole numbers can be represented as a fraction.
     - b. Understand the value of a fraction is not changed when both its numerator and denominator are multiplied or divided by the same number because it is the same as multiplying or dividing by one.
     - c. Find equivalent fractions and simplify fractions.
     - d. Model the multiplication and division of common fractions.
     - e. Explore finding common denominators using concrete, pictorial, and computational models.
     - f. Use <, >, or = to compare fractions and justify the comparison
     - g. Add and subtract common fractions and mixed numbers with unlike denominators.
     - h. Use fractions (proper and improper) and decimal fractions interchangeably.
     - i. Estimate products and quotients.

5. **Students will understand the meaning of percentage**
   - **Element:**
     - a. Explore and model percents using multiple representations.
     - b. Apply percents to circle graphs.

*Figure 3.* Fifth grade math numbers and operations strands and elements (Georgia Department of Education, 2008).
1. Students will extend their understanding of area and fundamental geometric plane figures.
   Element:
   d. Estimate the area of fundamental geometric plane figures.
   e. Derive the formula for the area of a parallelogram.
   f. Derive the formula for the area of a triangle.
   g. Find the areas of triangles and parallelograms using formulae.
   h. Estimate the area of a circle through partitioning and tiling and then with formula.
   i. Find the area of a polygon (regular and irregular) by dividing it into squares, rectangles, and/or
      triangles and find the sum of the areas of those shapes.
   j. Derive the formula for the area of a circle.
   k. Find the area of a circle using the formal and pi = 3.14.

2. Students will extend their understanding of perimeter to include circumference.
   Element:
   d. Derive the formula for the circumference of a circle.
   e. Find the circumference of a circle using the formula and pi = 3.14.

3. Students will measure capacity with appropriately chosen units and tools.
   Element:
   e. Use milliliters, liters, fluid ounces, cups, pints, quarts, and gallons to measure capacity.
   f. Compare one unit to another within a single system of measurement.

4. Students will understand and compute the volume of a simple geometric solid.
   Element:
   j. Understand a cubic unit is represented by a cube in which each edge has the length of 1 unit.
   k. Identify the units used in computing volume as cubic centimeters, cubic meters, cubic inches,
      cubic feet, and cubic yards.
   l. Derive the formula for finding the volume of a cube and a rectangular prism using
      manipulatives.
   m. Compute the volume of a cube and a rectangular prism using formulae.
   n. Estimate the volume of a simple geometric solid.
   o. Understand the similarities and differences between volume and capacity.

Figure 4. Fifth grade math measurement strands and elements (Georgia Department of
Education, 2008).

5. Students will understand congruence of geometric figures and the correspondence of their
   vertices, sides, and angles.

2. Students will understand the relationship of the circumference of a circle to its diameter.

Figure 5. Fifth grade math geometry strands (Georgia Department of Education, 2008).
### 5th Grade Math Standard

#### Algebra (M5A)

<table>
<thead>
<tr>
<th>1. Students will represent and interpret the relationships between quantities algebraically.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Element:</td>
</tr>
<tr>
<td>a. Use variables, such as n or x, for unknown quantities in algebraic expressions.</td>
</tr>
<tr>
<td>b. Investigate simple algebraic expressions by substituting numbers for the unknown.</td>
</tr>
<tr>
<td>c. Determine that a formula will be reliable regardless of the type of number substituted for the variable.</td>
</tr>
</tbody>
</table>

*Figure 6. Fifth grade math algebra strand and elements (Georgia Department of Education, 2008).*

### 5th Grade Math Standard

#### Data Analysis and Probability (M5D)

<table>
<thead>
<tr>
<th>1. Students will analyze graphs.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Element:</td>
</tr>
<tr>
<td>a. Analyze data presented in a graph</td>
</tr>
<tr>
<td>b. Compare and contrast multiple graphic representations for a single set of data and discuss the advantages/disadvantages of each.</td>
</tr>
<tr>
<td>c. Determine and justify the mean, range, mode, and media of a set of data.</td>
</tr>
</tbody>
</table>

*Figure 7. Fifth grade math data analysis and probability strand and elements (Georgia Department of Education, 2008).*

### 5th Grade Math Standard

#### Process Skills (M5P)

<table>
<thead>
<tr>
<th>1. Students will solve problems.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Element:</td>
</tr>
<tr>
<td>a. Build new mathematical knowledge through problem solving.</td>
</tr>
<tr>
<td>b. Solve problems that arise in mathematics and in other contexts.</td>
</tr>
<tr>
<td>c. Apply and adapt a variety of appropriate strategies to solve problems.</td>
</tr>
<tr>
<td>d. Monitor and reflect on the process of mathematical problem solving.</td>
</tr>
</tbody>
</table>

*Figure 8. Fifth grade math process skills strand and element (Georgia Department of Education, 2008).*

**Assessment of Georgia students’ math skills.** Just as with reading, fifth grade students’ math achievement is measured with the CRCT each spring. Students performing at the DNM level in math (a scale score below 800) demonstrate limited evidence of conceptual knowledge of the five content domains (Georgia Department of Education, 2010a). They have a basic understanding of the four arithmetic operations in
relation to whole numbers and decimals. These students show minimal evidence of computing simple problems involving area and volume. Students’ skills show limited evidence of their ability to use variables and to substitute numbers for the unknown in simple algebraic expressions or to represent and analyze data. Students performing at this level frequently make mathematical errors during computation and problem solving. They show minimal evidence of understanding and applying mathematical process skills to problem-solving situations. These students demonstrate little understanding of mathematical language, and they have difficulty translating mathematical representations to solve problems (Georgia Department of Education, 2010a).

Students who meet standards expectations in math (a scale score between 800 and 849) demonstrate evidence of conceptual knowledge of the five content domains (Georgia Department of Education, 2010a). Students performing at the M level demonstrate an understanding of the four arithmetic operations in relation to whole numbers and decimals. At this level of achievement students have an understanding of decimals and fractions. They can add and subtract fractions with unlike denominators. Students who meet the standard expectations are able to use common fractions and decimals interchangeably, and they can model percents. At the M level students can estimate and compute simple problems involving area and volume. They can measure capacity with appropriately chosen units. Students have some understanding of congruence of geometric figures and correspondence of their vertices, sides, and angles. Students who achieve at this level can use variables and substitute numbers for the unknown in simple algebraic expressions. To meet standards expectations students must be able to represent and analyze data. At this level students make few mathematical
errors during computation and problem solving. Students who meet the standards expectations understand and apply mathematical process skills to problem-solving situations. Students performing at this level of mastery demonstrate an understanding of mathematical language, and they translate mathematical representations to solve problems (Georgia Department of Education, 2010a).

Students who exceed on the math test (a scale score of 850 and above) demonstrate broad and in-depth evidence of conceptual and abstract knowledge of the five content domains (Georgia Department of Education, 2010a). At this level students have an advanced understanding of the four arithmetic operations in relation to whole numbers and decimals. These students have an advanced understanding of decimals and fractions. Students who achieve at this level can add and subtract fractions with unlike denominators as well as model multiplication and division of common fractions. This performance level indicates students are able to use fractions (proper and improper) and decimals interchangeably. Students can model percents and apply percents to circle graphs. Students can estimate and compute the area of geometric plane figures, including regular and irregular polygons and circles. At this level students are able to derive the formulas for the area of a triangle and of a parallelogram. These students can measure capacity with appropriately chosen units and can compare one unit to another. Students who exceed the standards expectations can estimate and compute the volume of simple geometric solids. They understand congruence of geometric figures and correspondence of their vertices, sides, and angles. Student performing at this level can use variables and substitute numbers for the unknown in algebraic expressions. They can represent and analyze data as well as compare multiple graphic representations for a single set of data.
Students performing at this level rarely make mathematical errors during computation and problem solving. These students understand mathematical process skills and integrate multiple strategies to problem-solving situations. Students at this mastery level demonstrate understanding of mathematical language and effectively translate mathematical representations to solve problems. Fifth grade students performing at the exceeds level also make connections and can justify mathematical interpretations clearly (Georgia Department of Education, 2010a).

**Summary**

The literature review included literature on student achievement, organizational structure, reading development, and math development. The socio-cultural theory, the theory of constructivism, and the social constructivist theory were chosen as the underpinning frameworks for the research study out of a desire to link the importance of the setting in which students learn to their acquisition and development of knowledge. Standardized curriculum and tests are not supported by the theoretical frameworks chosen for the current study, but the theorist’s ideas about the setting where students receive instruction is important to the purpose of the study.

Previous studies conducted on organizational structure found no particular benefit in alternative structures as measured by student achievement (Becker, 1987; Braddock et al., 1988; Des Moines Public Schools, 1989; ERIC, 1970; Hampton, 2007; Hood, 2010; Jackson, 1953; McPartland, 1987; Morrison, 1968; Page, 2009), while other studies on the same topic revealed statistically significant differences in student achievement based on organizational structure (Chang et al., 2008; McGrath & Rust, 2002; Moore, 2008; Williams, 2009).
There is still much to be learned about the relationship between organizational structure and student achievement. Conflicting results of prior studies on the topic of organizational structure reveal a need for further research (Alspaugh, 1998; Becker, 1987; Braddock et al., 1988; Chang et al., 2008; Contreras, 2009; Hood, 2010; McGrath & Rust, 2002; Moore, 2008; Page, 2009; Reed, 2002). The current study seeks to fill a gap in the literature by examining the impact of organizational structure on student achievement as measured by the 2010 CRCT while controlling for previous achievement.

Chapter 3 includes a detailed description of the methodology used in the current study. Participants are identified, and instruments used in the study are discussed. Procedures and the research design are explained. Hypotheses and research questions are stated. An overview of procedures used for analyzing data is presented.
CHAPER THREE: METHODOLOGY

Mandates associated with NCLB require schools to provide highly qualified teachers in the core subjects in every classroom (NCLB, 2001). Georgia teachers who teach in traditional classrooms serve as generalists and are required to provide instruction in all content areas. When teachers serve as content specialists instead of generalists, a departmentalized setting is created. Departmentalized settings reduce the number of subjects taught by each teacher and allow teachers to narrow their focus into specific content areas positively impacting student achievement (Gerretson et al., 2008).

The purpose of the current quantitative study was to determine whether a statistically significant difference existed in students’ reading and math achievement when students received instruction in a departmentalized setting from multiple teachers as opposed to a traditional classroom setting with one teacher who was responsible for instruction in all core content areas. The study was designed to evaluate participants’ achievement in reading and math as measured by the Georgia Criterion-Referenced Competency Test (CRCT).

Chapter 3 contains a detailed description of elements related to the method selected to conduct the study. Participants are identified, and methods used to conduct the research and analyze data are discussed.

Participants

The convenience sample was comprised of approximately 2,152 fifth grade students who attended public school in 14 rural counties within the Pioneer RESA district in northeast Georgia. To determine the student population of each elementary school within the RESA district, the researcher accessed data available on the Georgia
Governor’s Office of Student Achievement (GAOSA) website. The total population of each school was computed to arrive at a RESA fifth grade student population of approximately 5,371 (GAOSA, 2010). Because of the researcher’s affiliation with one of the schools, that school’s data were excluded from the study. Another rural school was excluded because student achievement data on the 2010 administration of the CRCT was not reported due to too few students’ participation in the test. One of the school districts containing 20 elementary schools declined consent to participate and was excluded from the study.

**Setting**

The setting of the current study was a RESA district that consisted of fourteen public school systems in northeast Georgia. Pre-kindergarten through fifth grades was the dominant grouping of the schools. The remainder of the schools used variations of grade level groupings. The school with the largest student population had 828 students in the spring of 2010. The school with the smallest student population had 200 students (GAOSA, 2010). The mean student population of the schools was 562 students.

Based on state standards, reading and math curriculum taught across the setting was the same. The GPS, broad statements of what students should know and be able to do in specific content areas (Georgia Department of Education, 2007), is the curriculum used by all teachers in the RESA district. Specific learning goals are identified by elements. Standards are grouped by strands in content areas (Georgia Department of Education, 2007).

Georgia’s fifth grade students expand upon the reading concepts, skills, and strategies learned in earlier grades (Georgia Department of Education, 2006). Semantics,
syntax, conceptual relationships, phonological properties, morphological properties, and reading to learn are taught in standards ELA5R3 and ELA5R4 of the fifth grade GPS (Georgia Department of Education, 2006). Within these standards students are expected to be able to determine the meaning of unfamiliar words using context clues. Fifth grade students also learn to determine the meaning of unfamiliar words using existing knowledge of common roots, suffixes, and prefixes. Upon mastery of these standards, students will be able to identify the meaning of common prefixes and identify alternate word choices. They use letter-sound knowledge to decode words by using phonemic awareness and context clues to determine pronunciation and meaning. Fluency is also developed and increased within these standards (Georgia Department of Education, 2006).

Stage four and five reading skills (multiple viewpoints, construction, and reconstruction) are taught in standards ELA5R1 and ELA5R2 (Georgia Department of Education, 2006). Students are taught to comprehend and explain a variety of literary and informational texts. They learn to make connections with text and to relate new information to prior knowledge. Upon mastery of these standards, students will understand that theme refers to the author’s message and will read thoughtfully and purposefully. They will identify the author’s perspective and supporting details, and they will be able to analyze the effect of figurative language. Students in fifth grade further develop their understanding of character, setting, and plot. They learn to respond to imagery when responding to literature (Georgia Department of Education, 2006).

All fifth grade teachers in the RESA district were required to use the GPS for teaching math. Content domains include number and operations, measurement,
geometry, algebra, and data analysis and probability, and process skills (Georgia Department of Education, 2008). Students in fifth grade maintain skills and concepts learned in earlier grades while further developing their understanding of multiplication and division of whole numbers, decimals and fractions (Georgia Department of Education, 2008).

The math curriculum taught consistently throughout the district requires that students gain understanding and ability to investigate algebraic mathematical expressions and to expand their understanding of computing area and volume of simple geometric figures. Geometry concepts are developed further to include understanding of congruent shapes and the relationship of the circumference of a circle to its diameter. Fifth grade students also are taught to use percentages and circle graphs to interpret statistical data (Georgia Department of Education, 2008).

**Instrumentation**

**Administrator survey.** A survey was created by the researcher and emailed to 36 administrators of elementary schools in the Pioneer RESA district. The researcher used the results of this survey to identify groups for the study. Using the survey, administrators answered questions about the organizational structure used in their schools. The survey included questions relevant to the study including: (a) school name, (b) district name, (c) organizational structure used in fifth grade classrooms during the 2009-2010 school year (departmentalized or traditional), and (d) organizational structure used in third grade classrooms during the 2007-2008 school year (departmentalized or traditional).
**Georgia 2010 CRCT.** Student achievement scores on the reading and math CRCT were the dependent variables for the study. Achievement was measured using archival data from the 2010 Georgia CRCT results. CRCT data provide information about academic achievement. The data are disaggregated into reports at the student, class, school, system, and state level. Data from these reports are used to assess student mastery of the GPS. Stakeholders use these reports to diagnose individual student strengths and weaknesses and to judge the quality of education provided by Georgia’s teachers (Georgia Department of Education, 2010b).

CRCT data are represented in reliable scores, including raw, scale, and standard scores. A raw score is the number of test items the student answers correctly. The Georgia Department of Education (2009a) defines a scale score as a score expressing the results of a particular test for all forms and levels on a single common scale. Using scale scores provides for uniform interpretation of performance and allows comparisons to be made from year to year with the same test. Standard score is defined as a general term referring to any of the types of ‘transformed’ scores. Raw scores are expressed in terms of standard scores for reasons of convenience, comparability, and ease of interpretation. Raw scores of two tests can be expressed in comparable terms by using standard scores (Georgia Department of Education, 2009a). Scores for the test are expressed as performance levels, a range of scores defining a specific level of performance, as articulated in the Performance Level Descriptors. There are three performance levels for the CRCT: Exceeds the Standard (E), Meets the Standard (M), and Does Not Meet the Standard (DNM). A student who does not meet the standard receives a scale score below 800. A student who meets the standard receives a scale score between 800-849. A
student who exceeds the standard receives a score of 850 and above (Georgia Department of Education, 2010a).

**Procedures**

Before any data were collected or analyzed, the researcher obtained permission to conduct the study. First, the researcher secured permission from Pioneer RESA’s Board of Control to obtain archival data directly from the agency. The Board of Control consists of the RESA director and the 14 superintendents from the school districts that comprise the RESA district. Receiving permission from RESA’s Board of Control was crucial because this agency has capability to provide access to data necessary for the study. Next, the researcher submitted an expedited application to Liberty University’s Institutional Review Board seeking approval to conduct the study. An expedited application was necessary because survey data collected from school administrators was not anonymous. An expedited application was also appropriate because student performance data were analyzed; therefore, no student surveys or interviews were connected to the study.

After IRB granted approval to conduct the study, the researcher contacted school administrators to gain information about the type of organizational structure used in their schools. A list of administrators was obtained from Pioneer RESA’s website. The purpose of the quantitative study was to determine if there was a statistically significant difference in the reading and math achievement scores of fifth grade students who received instruction in a departmentalized setting as opposed to those who received instruction in a traditional setting as measured by the 2010 reading and math scores on the Georgia CRCT.
The researcher sent an introductory email to the administrators of the elementary schools in the RESA district. In the email the researcher briefly explained the study. An informed consent form was sent as an electronic attachment to the email. In the introductory email, the researcher asked the administrators to reply via email with the answer to the following two survey questions: (a) Did your school use departmentalized or traditional structure in 5th grade during the 2009-10 school year? (b) Did your school use departmentalized or traditional structure in 3rd grade during the 2007-08 school year? In the email, the researcher explained that a departmentalized setting is defined as one where teachers teach in their area of specialization and students move from one classroom to another for instruction. In this setting, students have more than one teacher for core subjects, and each teacher is responsible for a specific subject or group of subjects. A traditional classroom setting is defined as one where a single teacher is responsible for all core content areas for a particular group of students for the entire school year. The researcher explained that administrators’ response to the email implied consent. The researcher’s email account was password protected; therefore access to email correspondence was limited and maintained confidentiality of respondents. Respondents’ email responses were printed and stored in a secure file. After a hard copy of the responses was printed, the email was deleted from the email inbox.

The administrator responses were used to divide data into two comparison groups for the study: (a) schools utilizing a traditional classroom setting during the 2009-2010 school year and (b) schools utilizing some form of departmentalized classroom setting during the 2009-2010 school year. Establishing the kind of organizational structure used in each school was necessary in order to assign students to comparison groups for the
Students who received instruction in departmentalized settings were assigned to Group A. Students who received instruction in traditional settings were assigned to Group B.

Results from the surveys were further used to exclude from the study schools that did not meet the study criteria. Six schools that used a departmentalized setting during the 2007-2008 school year were excluded from the study because of participants’ exposure to departmentalization prior to school year 2009-2010. One school that was newly opened after the 2008 CRCT administration was also excluded from the study.

Upon IRB approval, comparison groups were compiled and the list of schools in each group was submitted to the Pioneer RESA’s analysis department. The analysts were requested to provide aggregated reports of each school’s data (fifth grade reading and math 2010 CRCT data and the same schools’ third grade reading and math 2008 CRCT data). Achievement scores of students who did not participate in both the 2008 and 2010 administrations of the CRCT were excluded from the reports.

Demographic data were analyzed, and similarities in schools’ demographics were reported. Archival data from reading and math scores from the 2008 and 2010 administration of the CRCT were analyzed to answer the following research questions:

(a) Is there a difference in fifth grade mean reading achievement scale scores on the 2010 CRCT among students who received instruction in departmentalized settings as opposed to those who received instruction in traditional settings? (b) Is there a difference in fifth grade mean math achievement scale scores on the 2010 CRCT among students who received instruction in departmentalized settings as opposed to those who received instruction in traditional settings?
Research Design

A causal-comparative design was used to determine whether there was a statistically significant difference in fifth grade students’ reading and math achievement scores based on setting as measured by the 2010 Georgia CRCT. Quantitative methods were used in the study. Quantitative methods involve the process of collecting, analyzing, interpreting, and writing the results of a study (Creswell, 2003). Independent variables within the study, departmentalized and traditional classroom settings, were the basis for the study. A causal-comparative design was appropriate because the research was a non-experimental investigation in which possible cause-and-effect relationships were identified by forming groups of individuals in whom the independent variable was present or absent and then determining whether the groups differed on the dependent variable (Gall et al., 2007). Because it was not possible to randomly assign the participants to comparison groups, it was necessary to form comparison groups by a selection process including surveying administrators to determine the type of organizational structure used in the schools. A causal comparative design was further justified because the objective was to determine the cause for existing differences between two groups as measured by academic achievement on the CRCT.

Validity. Although threats to validity were present in the study, assumptions were tested to determine whether they were violated. Utilizing parametric statistics addressed specific assumptions, attempting to increase validity of the study. Results of assumption testing are discussed in chapter 4. Instructional strategies used by teachers were not considered in the study. The teachers’ experience was not considered. Specialized teacher training or professional development in specific content areas was not
considered. These factors may have presented an implementation threat to validity. Because the groups may differ on variables other than the independent variables (departmentalized and traditional settings), differential selection could pose a threat to internal validity. Because it was not possible to eliminate external factors which may have affected student achievement, setting could threaten validity. The potential of studying non-equivalent groups existed. To control for previous academic achievement of participants before the introduction of the independent variable (departmentalization), 2008 achievement data served as a covariant during data analysis.

Achievement data from only one grade level was analyzed; therefore, a population threat was present. A population threat to validity exists when it is questionable that results of the study can be generalized to a defined population (Bracht & Glass, 1968). It may not be possible to assume results of this study can be generalized to the population the sample represents. To address this threat to validity, a large sample size was studied. Studying a large sample in causal-comparative research can reduce the probability that the sample has different characteristics than the population from which it was drawn (Gall et al., 2007).

For a study to be valid, the researcher must use tests or other measuring devices that truly measure what is to be measured (Georgia Department of Education, 2009a). To ensure a high degree of validity within this study, reading achievement results from the CRCT were used. This mandatory state assessment is administered annually to all students in grades 1-8 enrolled in Georgia public schools (Georgia Department of Education, 2009a). The CRCT measures student acquisition of the knowledge, concepts, and skills set forth in the GPS. This study is valid because the CRCT is designed to
measure what is taught in Georgia public schools at each specific grade level (Georgia Department of Education, 2010b). The primary purpose of the CRCT is to provide a valid measure of the quality of educational services provided throughout the state (Georgia Department of Education, 2011).

**Reliability.** For a study to be reliable, it must consistently reproduce the same or similar results if other researchers conducted the study using exactly the same procedures (Georgia Department of Education, 2009a). This study is reliable because data were compiled from CRCT tests administered in 2010. The CRCT uses two common indicators of reliability: (a) Cronbach’s alpha and (b) the standard error of measurement (SEM).

Cronbach’s alpha measures the internal consistency over the responses to a set of items measuring an underlying unidimensional trait (Cronbach, 1951). The second statistical index used to describe test score reliability for the CRCT is the SEM, which is an index of the random variability in tests scores. The SEM is related to Cronbach’s alpha in that a student’s score would fall within a band of plus one SEM and minus one SEM a majority of the time if the student took the test multiple times, assuming no learning took place between administrations. The SEM provides the band or spread of students’ scores if they were to be assessed multiple times. The SEM can be calculated in terms of raw scores or scale scores. The SEMs from the CRCT are based on scale scores. These two indicators of reliability and precision are considered industry standards when addressing the reliability of a measure (Georgia Department of Education, 2009b). The data from the CRCT tests are not open to error of interpretation. Georgia ensures tests are administered fairly and ethically by monitoring the following
areas: test security, test preparation, test administration, and test data. Test materials are secure before, during, and after testing (Georgia Department of Education, 2009a). The test is designed to reflect the curriculum being taught. All persons who administer the test participate in mandatory training of proper policies and procedures. Tests are designed to produce valid and reliable results (Georgia Department of Education, 2009a).

**Research Questions and Hypotheses**

The study attempted to answer the following research questions:

**Research Question #1:** Is there a difference in fifth grade mean reading achievement scale scores on the 2010 CRCT among students who received instruction in departmentalized settings as opposed to those who received instruction in traditional settings?

**Hypothesis #1:** There is a statistically significant difference in students’ fifth grade mean reading achievement scale scores as measured by the 2010 CRCT based on organizational structure (traditional vs. departmentalized) when 2008 reading CRCT scores are used as a covariate.

**Null Hypothesis 1-H_{01}**: There is no statistically significant difference in students’ fifth grade mean reading achievement scale scores as measured by the 2010 CRCT based on organizational structure (traditional vs. departmentalized) when 2008 reading CRCT scores are used as a covariate.

**Research Question #2:** Is there a difference in fifth grade mean math achievement scale scores on the 2010 CRCT among students who received instruction in departmentalized settings as opposed to those who received instruction in traditional settings?
Hypothesis #2: There is a statistically significant difference in students’ fifth grade mean math achievement scale scores as measured by the 2010 CRCT based on organizational structure (traditional vs. departmentalized) when 2008 math CRCT scores are used as a covariate.

Null Hypothesis 2-$H_0^2$: There is no statistically significant difference in students’ fifth grade mean math achievement scale scores as measured by the 2010 CRCT based on organizational structure (traditional vs. departmentalized) when 2008 math CRCT scores are used as a covariate.

**Data Analysis**

Exploratory data analyses were conducted and descriptive statistics were computed for demographics and 2010 reading and math CRCT scores for each comparison group. Group A consisted of data from students who received instruction in a departmentalized setting during the 2009-2010 school year. Group B consisted of data from students who received instruction in a traditional setting during the 2009-2010 school year.

Prior to conducting parametric tests, assumptions were tested using appropriate statistical analyses. Parametric statistics utilizing analysis of covariance (ANCOVA) were computed using 2010 reading and math CRCT achievement scores to determine whether the mean scores of the two subgroups significantly differed. ANCOVA is a merger of ANOVA, analysis of variance, and regression for continuous variables. Analysis of covariance is used to test the main and interaction effects of categorical variables on a continuous dependent variable, controlling for the effects of selected other
variables, which co-vary with the dependent variable (Gall et al., 2007; Leedy & Ormrod, 2010).

Analysis of covariance is used in causal-comparative and experimental studies (Gay et al., 2009). Utilizing analysis of covariance was appropriate for the current causal-comparative study because the researcher’s objective was to reduce the confounding influence of differences in the independent variable (departmentalized and traditional settings) while attempting to determine the cause for existing differences in dependent variables (reading and math achievement) among subgroups of students. To control for previous achievement, participants’ 2008 reading and math CRCT achievement scores served as covariates. Utilizing analysis of covariance was appropriate for the current study because the objective was to reduce the confounding influence of group differences. By using ANCOVA, groups were equalized with respect to the control variable and then compared (Gay et al., 2009). Statistical significance was determined based on an alpha of ≤ .05.

**Summary**

The study was designed to determine if a statistical difference existed in mean reading and math CRCT results of fifth grade students who were taught in departmentalized settings and fifth grade students who were taught in traditional settings. Fifth grade students from 29 elementary schools within the Pioneer RESA district served as the convenience sample for the study.

CRCT results yield information on academic achievement at the student, class, school, system, and state levels (Georgia Department of Education, 2010b). Student
achievement as measured by archival data from 2010 reading and math CRCT scores served as dependent variables for the study.

The study is valid because the instrument used as the basis for data analysis is valid. The CRCT is designed to measure what is taught in Georgia public schools at each specific grade level (Georgia Department of Education, 2010b). This study is reliable because data was compiled from CRCT tests administered in 2010. CRCT tests are designed to produce valid and reliable results (Georgia Department of Education, 2009a).

Exploratory data analysis was conducted and descriptive statistics were computed for 2010 reading and math CRCT scores for each comparison group. An ANCOVA was conducted using 2008 reading and math CRCT achievement data as a covariant to control for previous achievement against 2010 reading and math CRCT achievement data. Assumptions were tested using appropriate statistical analyses. Statistical significance was determined based on an alpha of ≤ .05.

Chapter 4 includes the results of data analysis. Tables and figures are presented and explained. Assumptions testing of parametric statistical analysis is discussed. Hypotheses were tested using ANCOVA analysis, and results are presented.
CHAPTER FOUR: RESULTS

Introduction

The purpose of the quantitative study was to determine if there was a statistically significant difference in the reading and math achievement scores of fifth grade students who received instruction in a departmentalized setting as opposed to those who received instruction in a traditional setting as measured by archival data from the 2010 reading and math scores on the Georgia CRCT.

Descriptive statistics are presented first in this chapter. To ensure that assumptions are not violated prior to conducting ANCOVA, appropriate tests were conducted, and results of assumptions testing are presented next. Then, the results of ANCOVA are presented to examine the effect of the independent variable (organizational structure) on the dependent variables (reading and math achievement). Finally, the research questions are answered, and results are summarized.

Descriptive Statistics. Students from 29 elementary schools in the RESA district were the specific focus of the study, and they served as the convenience sample. Students were approximately between the ages of nine and 11 years old. Students were sorted into two groups (a) students who received instruction in a departmentalized setting and (b) students who received instruction in a traditional setting. There was a total of 2,152 students in the sample. Table 2 shows the sample size for setting and subject area (reading and math). To increase validity of the study, the students who did not participate in both administrations of the 2008 and 2010 CRCT were excluded from the study.
Table 2

*Frequency Table of Setting by Subject and Sample Size*

<table>
<thead>
<tr>
<th>Setting</th>
<th>Subject</th>
<th>n</th>
</tr>
</thead>
<tbody>
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<td>1182</td>
</tr>
<tr>
<td>Departmentalized</td>
<td>Math</td>
<td>1185</td>
</tr>
<tr>
<td>Traditional</td>
<td>Reading</td>
<td>966</td>
</tr>
<tr>
<td>Traditional</td>
<td>Math</td>
<td>964</td>
</tr>
</tbody>
</table>

Groups’ demographics were analyzed to determine discrepancy in sample characteristics.

Similarities and differences between the groups are reported in Tables 3 and 4.
Table 3

Frequency Table of Setting by Gender

<table>
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<th>Setting</th>
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<th>n %</th>
<th>Male</th>
<th>n %</th>
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<td>69</td>
<td>34</td>
<td>49.3</td>
<td>35</td>
<td>50.7</td>
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<td>65.4</td>
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<td>51</td>
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<td>39.2</td>
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<td>29</td>
<td>13</td>
<td>44.8</td>
<td>16</td>
<td>55.2</td>
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<td>1</td>
<td>64</td>
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<td>47.6</td>
<td>43</td>
<td>52.4</td>
</tr>
<tr>
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<td>50</td>
<td>27</td>
<td>50</td>
</tr>
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<td>2</td>
<td>103</td>
<td>55</td>
<td>53.4</td>
<td>48</td>
<td>46.6</td>
</tr>
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<td>67</td>
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<td>56.7</td>
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<td>52.5</td>
</tr>
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<td>69.2</td>
</tr>
<tr>
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<td>70</td>
<td>38</td>
<td>54.3</td>
<td>32</td>
<td>45.7</td>
</tr>
<tr>
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<td>2</td>
<td>71</td>
<td>35</td>
<td>49.3</td>
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<td>50.7</td>
</tr>
<tr>
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<td>2</td>
<td>59</td>
<td>25</td>
<td>42.4</td>
<td>34</td>
<td>57.6</td>
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<td>76</td>
<td>39</td>
<td>51.3</td>
<td>37</td>
<td>48.7</td>
</tr>
<tr>
<td>28</td>
<td>2</td>
<td>42</td>
<td>22</td>
<td>52.4</td>
<td>20</td>
<td>47.6</td>
</tr>
<tr>
<td>29</td>
<td>2</td>
<td>165</td>
<td>71</td>
<td>43.0</td>
<td>94</td>
<td>57.0</td>
</tr>
</tbody>
</table>

Total

Note. 1 = departmentalized; 2 = traditional

Each group was ethnically diverse, but the majority of the participants were Caucasian. The ethnic breakdown of the participants was 1.2% Asian, 7.1% Black,
16.8% Hispanic, 72.8% Caucasian, 1.7% Multi-racial, and .03% American Indian. Table 4 shows the ethnic breakdown of the sample.

Table 4

*Frequency Table of Setting by Ethnicity*

<table>
<thead>
<tr>
<th>Ethnicity</th>
<th>$n$</th>
<th>$n%$</th>
<th>Departmentalized Group</th>
<th>Group %</th>
<th>Traditional Group</th>
<th>Group %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Asian</td>
<td>26</td>
<td>1.21</td>
<td>8</td>
<td>0.67</td>
<td>18</td>
<td>1.86</td>
</tr>
<tr>
<td>Black</td>
<td>153</td>
<td>7.11</td>
<td>68</td>
<td>5.73</td>
<td>85</td>
<td>8.80</td>
</tr>
<tr>
<td>Hispanic</td>
<td>362</td>
<td>16.82</td>
<td>138</td>
<td>11.64</td>
<td>224</td>
<td>23.19</td>
</tr>
<tr>
<td>Caucasian</td>
<td>1567</td>
<td>72.82</td>
<td>949</td>
<td>80.02</td>
<td>618</td>
<td>63.98</td>
</tr>
<tr>
<td>Multi-racial</td>
<td>36</td>
<td>1.67</td>
<td>18</td>
<td>1.52</td>
<td>18</td>
<td>1.86</td>
</tr>
<tr>
<td>American Indian</td>
<td>8</td>
<td>0.37</td>
<td>5</td>
<td>0.42</td>
<td>3</td>
<td>0.31</td>
</tr>
<tr>
<td>Total</td>
<td>2152</td>
<td>100.00</td>
<td>1186</td>
<td>100.00</td>
<td>966</td>
<td>100.00</td>
</tr>
</tbody>
</table>

Each group included students who were economically disadvantaged (ED), identified as having a disability (SWD), and who were identified as being limited English proficient (LEP). Each group also included students who were identified as being gifted learners. Table 5 shows the breakdown of the sample’s demographics in these disaggregated categories.

Table 5

*Frequency Table of Setting by Disaggregated Demographics*

<table>
<thead>
<tr>
<th>Category</th>
<th>$n$</th>
<th>$n%$</th>
<th>Departmentalized Group</th>
<th>Group %</th>
<th>Traditional Group</th>
<th>Group %</th>
</tr>
</thead>
<tbody>
<tr>
<td>ED</td>
<td>1,295</td>
<td>64.69</td>
<td>683</td>
<td>68.51</td>
<td>612</td>
<td>60.90</td>
</tr>
<tr>
<td>SWD</td>
<td>268</td>
<td>13.39</td>
<td>146</td>
<td>14.64</td>
<td>122</td>
<td>12.14</td>
</tr>
<tr>
<td>LEP</td>
<td>150</td>
<td>7.49</td>
<td>44</td>
<td>4.41</td>
<td>106</td>
<td>10.55</td>
</tr>
<tr>
<td>Gifted</td>
<td>289</td>
<td>14.44</td>
<td>124</td>
<td>12.44</td>
<td>165</td>
<td>16.42</td>
</tr>
<tr>
<td>Total</td>
<td>2,002</td>
<td>100.00</td>
<td>997</td>
<td>100.00</td>
<td>1005</td>
<td>100.00</td>
</tr>
</tbody>
</table>

Note. ED = economically disadvantaged; SWD = student with a disability; LEP = limited English proficient.
Research Questions and Hypotheses. While seeking to determine whether a statistically significant difference exists between fifth grade students’ achievement as measured by 2010 reading and math CRCT based on organizational structure, this study attempted to answer the following research questions:

Research Question #1: Is there a difference in fifth grade mean reading achievement scale scores on the 2010 CRCT among students who received instruction in departmentalized settings as opposed to those who received instruction in traditional settings?

Hypothesis #1: There is a statistically significant difference in students’ fifth grade mean reading achievement scale scores as measured by the 2010 CRCT based on organizational structure (traditional vs. departmentalized) when 2008 reading CRCT scores are used as a covariate.

Null Hypothesis 1-H$_{01}$: There is no statistically significant difference in students’ fifth grade mean reading achievement scale scores as measured by the 2010 CRCT based on organizational structure (traditional vs. departmentalized) when 2008 reading CRCT scores are used as a covariate.

Research Question #2: Is there a difference in fifth grade mean math achievement scale scores on the 2010 CRCT among students who received instruction in departmentalized settings as opposed to those who received instruction in traditional settings?

Hypothesis #2: There is a statistically significant difference in students’ fifth grade mean math achievement scale scores as measured by the 2010 CRCT based on
organizational structure (traditional vs. departmentalized) when 2008 math CRCT scores are used as a covariate.

Null Hypothesis 2-$H_{02}$: There is no statistically significant difference in students’ fifth grade mean math achievement scale scores as measured by the 2010 CRCT based on organizational structure (traditional vs. departmentalized) when 2008 math CRCT scores are used as a covariate.

Assumptions Testing

Two of the most common assumptions of parametric statistics are (a) the data reflect an interval or ratio scale and (b) the data fall in a normal distribution (Leedy & Ormrod, 2010). An assumption is an assertion presumed to be true but not actually verified (Gay et al., 2009). Prior to conducting the ANCOVA, the following assumptions were considered: (a) the dependent variables (2010 reading and math CRCT scores) and covariate (2008 reading and math CRCT scores) were scale scores; (b) the covariate and variables (2008 and 2010 reading and math CRCT scores) were reliable; (c) CRCT reading and math scores were normally distributed (normality); (d) the population variances between the two groups were equal (homogeneity of variance); (e) interactions between the covariate and variable were absent (homogeneity of regression slopes); (f) a linear relationship existed between each group; and (g) participants’ reading and math scores (dependent variables) within the group were not affected by other participants’ scores (independence of observations). Figure 9 provides a visual representation of data analysis procedures.
Figure 9. Visual representation of data analysis procedures.

CRCT scores are represented in scale scores, thus providing for uniform interpretation of performance and allowing comparisons to be made from year to year with the same test (Georgia Department of Education, 2009a); therefore, the first assumption was not violated. The CRCT is designed to measure what is taught in Georgia public schools at each specific grade level (Georgia Department of Education, 2010b). The primary purpose of the CRCT is to provide a valid measure of the quality of educational services provided throughout the state (Georgia Department of Education, 2011); therefore, the covariate (2008 reading and math CRCT scores) is reliable and does not violate the reliability assumption.

Utilizing a large sample size helped ensure scores were normally distributed. Table 6 shows mean scores for schools’ 2008 and 2010 reading and math CRCT.
Table 6

Schools' Mean Scale Scores for 2008 and 2010 Reading and Math CRCT

<table>
<thead>
<tr>
<th>School</th>
<th>Setting</th>
<th>Mean 2010 Reading Scale Score</th>
<th>Mean 2010 Math Scale Score</th>
<th>Mean 2008 Reading Scale Score</th>
<th>Mean 2008 Math Scale Score</th>
</tr>
</thead>
<tbody>
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<td>1</td>
<td>822</td>
<td>814</td>
<td>816</td>
<td>802</td>
</tr>
<tr>
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<td>1</td>
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<td>849</td>
<td>856</td>
<td>872</td>
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<td>2</td>
<td>819</td>
<td>817</td>
<td>827</td>
<td>832</td>
</tr>
<tr>
<td>23</td>
<td>2</td>
<td>820</td>
<td>833</td>
<td>821</td>
<td>816</td>
</tr>
<tr>
<td>24</td>
<td>2</td>
<td>827</td>
<td>827</td>
<td>828</td>
<td>820</td>
</tr>
<tr>
<td>25</td>
<td>2</td>
<td>835</td>
<td>854</td>
<td>843</td>
<td>847</td>
</tr>
<tr>
<td>26</td>
<td>2</td>
<td>841</td>
<td>853</td>
<td>840</td>
<td>841</td>
</tr>
<tr>
<td>27</td>
<td>2</td>
<td>841</td>
<td>845</td>
<td>845</td>
<td>841</td>
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<tr>
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<td>2</td>
<td>816</td>
<td>807</td>
<td>813</td>
<td>801</td>
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<tr>
<td>29</td>
<td>2</td>
<td>837</td>
<td>848</td>
<td>847</td>
<td>835</td>
</tr>
</tbody>
</table>

Note. 1 = departmentalized; 2 = traditional

**Research question 1.** A one-way between-groups analysis of covariance was conducted to test the first null hypotheses. \( H_{01} \): There is no statistically significant
difference in fifth grade students’ mean reading achievement scale scores as measured by the 2010 CRCT based on organizational structure (traditional vs. departmentalized) when 2008 reading CRCT scores are used as a covariate. The independent variable was the setting (departmentalized or traditional), and the dependent variable was student achievement as measured by 2010 reading CRCT scores.

Table 7 lists the means, standard deviations, and sample sizes of the dependent variable (2010 reading CRCT scores) and the covariate (2008 reading CRCT scores) by setting. Note that the design is not balanced. There are 221 more students in the departmentalized setting than the traditional setting. For the dependent variable, the sample mean for the traditional group is slightly higher than the departmentalized group, and the traditional group is slightly more variable than the departmentalized group. Because the smaller sample size group is more variable, the actual type I error rate is larger than anticipated (Montgomery, 2009). However, the variation in reading scores is only slightly larger for the traditional group; therefore, the significance level is not impacted substantially.

Table 7

Descriptive Statistics of Reading Scores for Dependent Variable and Covariate by Setting

<table>
<thead>
<tr>
<th>Setting</th>
<th>Setting</th>
<th>n</th>
<th>M</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>2010 Reading CRCT</td>
<td>Departmentalized</td>
<td>1185</td>
<td>832.73</td>
<td>24.88</td>
</tr>
<tr>
<td>2010 Reading CRCT</td>
<td>Traditional</td>
<td>964</td>
<td>832.90</td>
<td>26.69</td>
</tr>
<tr>
<td>2008 Reading CRCT</td>
<td>Departmentalized</td>
<td>1185</td>
<td>834.70</td>
<td>29.04</td>
</tr>
<tr>
<td>2008 Reading CRCT</td>
<td>Traditional</td>
<td>964</td>
<td>838.03</td>
<td>29.59</td>
</tr>
</tbody>
</table>

Note.  n = total number of students.

In order for the results of the ANCOVA to be generalized to the population of interest (all elementary schools with traditional or departmentalized settings), several modeling assumptions must be verified. “Model adequacy can be easily investigated by
the examination of residuals” (Montgomery, 2009, p. 75). The errors for the ANCOVA should be normally identically distributed (NID) with mean 0 and constant variance $\sigma^2$. The appearance of a moderate departure from normality does not necessarily imply a serious violation of the assumptions. The model requires independent observations. Because the reading CRCT is a high stakes test with utmost attention given to proctoring and proper scoring, it is safe to assume that scores are independent. Figure 10 displays a normal probability plot of the 2010 reading CRCT residuals for the ANCOVA.

![Normal Q-Q Plot of 2010 Reading CRCT Scores](image)

10. Normal Q-Q plot of 2010 reading CRCT.

The residuals fall close to the line for most values indicating the normality of errors. The upper tail does display a departure from the line. This can be explained by the fact that the CRCT has a maximum value and the highest scores are lower than
expected for normally distributed data. The F statistic is only slightly affected because the test statistic is robust to the normality assumption (Montgomery, 2009). Figures 11 and 12 present histograms of the 2008 and 2010 math CRCT scores by setting. The data were graphed as histograms with normal curves to assess the range and the degree to which the data were distributed normally. Histograms for 2008 and 2010 reading scores indicate a slight right skew. A measure within +/- 1 is acceptable for normal data. There is not strong evidence of non-normal population. Studying reasonably large samples also reduces the impact that positive skewness and kurtosis has in the data analysis (Tabachnick & Fidell, 2007); therefore, these values do not lead to the conclusion that the assumption of normality is violated.

Figure 11. Histogram of 2008 reading CRCT scores.
Figure 12. Histogram of 2010 reading CRCT scale scores.

The ANCOVA was performed using the Statistical Package for Social Sciences (SPSS). An ANCOVA has the same modeling assumptions as an analysis of variance (ANOVA) with the additional requirements: (a) there must be a linear relationship between the covariate (2008 reading CRCT) and the response (2010 reading CRCT) and (b) the regression slopes must be equal for each treatment group (Montgomery, 2009).

The scatterplot and statistical analysis of reading CRCT scale scores indicate that the additional requirements of an ANCOVA have been met. SPSS was used to generate the scatterplot to test for the linearity assumption depicted in Figure 13. The dependent variable (2010 reading CRCT scores) was used as the y-axis, and the covariate (2008
reading CRCT scores) was used as the x-axis. The general distribution of scores pointing upwards and to the right indicates a positive linear relationship for each group.

Figure 13. Scatterplot of 2010 reading CRCT scores versus 2008 reading CRCT scale scores.

The assumption of homogeneity of regression slopes was tested by including the interaction term in the general linear model. The interaction of setting and 2008 reading CRCT yields $F(1, 2145) = 0.175$, $p = 0.676$, $\eta^2 < 0.001$. This indicates that the interaction of setting and 2008 Reading CRCT is not statistically significant at the $\alpha = .05$ level.

The general linear model was analyzed with only the main effects, setting, and 2008 reading CRCT without the interaction term. The covariate, 2008 reading CRCT,
proves to be a significant predictor for 2010 reading CRCT with $F(1, 2146) = 2125.89$, $p < 0.001$, $\eta^2 = 0.498$. This indicates that the inclusion of 2008 reading CRCT explains 49.8% of the variation in 2010 reading CRCT scores. The experimental factor of school setting is also a significant predictor for 2010 reading CRCT with $F(1, 2146) = 5.68$, $p = 0.017$, $\eta^2 = 0.003$. This result indicates that although setting produces a statistically significant difference in 2010 reading CRCT scores, the estimated effect size is very small. Only 0.3% of the variation in 2010 Reading CRCT scores is explained by school setting. The observed power of 0.664 indicates that if the parameters are as expected, the null hypothesis will be rejected 66.4% of the time that this experiment is conducted.

Table 8 shows the adjusted mean and confidence intervals after the removal of the effect of the covariate.

Table 8

<table>
<thead>
<tr>
<th>Setting</th>
<th>Mean</th>
<th>Standard Error</th>
<th>95% Confidence Interval</th>
</tr>
</thead>
<tbody>
<tr>
<td>Departmentalized</td>
<td>833.65</td>
<td>0.53</td>
<td>832.62 – 834.69</td>
</tr>
<tr>
<td>Traditional</td>
<td>831.77</td>
<td>0.59</td>
<td>830.62 – 832.92</td>
</tr>
</tbody>
</table>

The parameter estimates for the reading ANCOVA for the departmentalized setting results in an estimate of 1.89. This indicates that, on average, a student in the departmentalized setting scores 1.89 points higher on the 2010 reading CRCT than a student in the traditional setting when accounting for 2008 reading CRCT scores.

The equality of variance assumption was tested statistically using Levene’s test. At the $\alpha = 0.05$ level, $F(1, 2147) = 6.36$, $p < 0.012$. The significant test indicates that there is sufficient statistical evidence that the error variances are unequal. Because the smaller sample size group is more variable, the significance level for the ANCOVA is larger than
expected. This increases the rate of type I errors, rejecting the null hypothesis that there is no difference in 2010 reading scores when in fact there is no difference. This is a limitation in the current study and explains the low observed power, 66.4%. The scatterplot matrix in Figure 14 shows that variances of the residuals versus predicted values are not equal. The residuals for reading 2010 versus predicted reading 2010 are more condensed vertically for traditional than the departmentalized groups. Based on both the significance tests and plots, the constant variance assumption is in question.

![Figure 14](image)

*Figure 14. Scatterplot matrix of predicted residuals versus predicted values.*

The following stabilizing transformations were conducted in order of strength to decrease the variance: (a) square root, (b) logarithms, (c) reciprocal square root, and (d) reciprocal. None of these transformations improved the inconstant variance. Because the assumption of equality of variance is violated, results of the analysis may be incorrect or misleading. Although the assumption of equal variances was violated, the researcher
continued with ANCOVA for reading scores because using a large sample makes the procedure more robust to violation of assumptions (Tabachnick & Fidell, 2007).

After interpreting the results of the ANCOVA, the null hypotheses of no difference in the mean reading CRCT scores for each setting was rejected based on statistically significant results; however, the actual difference in the adjusted mean scores of the groups was very small (833.65, 831.77). This is evident in the small effect size (partial eta squared = .3). With a large enough sample (in this case N = 2148), quite small differences can become statistically significant, even if the difference between the groups is of little practical importance (Utts & Heckard, 2011).

Research Question 2: In order to answer the second research question, data were analyzed using SPSS version 19. Table 9 lists the means, standard deviations, and sample sizes of the dependent variable (2010 math CRCT scores) and the covariate (2008 math CRCT scores) by setting. Note that the design is not balanced. There are 216 more students in the departmentalized setting than traditional. For the dependent variable, the sample mean for the departmentalized group is slightly higher than the traditional group, and the traditional group is slightly more variable than the departmentalized group. Because the smaller sample size group is more variable, the actual type I error rate is larger than anticipated (Montgomery, 2009). However, the variation in math scores is only slightly larger for the traditional group; therefore, the significance level is not impacted substantially.
Table 9

*Descriptive Statistics of Math Scores for Dependent Variable and Covariate by Setting*

<table>
<thead>
<tr>
<th>Setting</th>
<th>Setting</th>
<th>n</th>
<th>M</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>2010 Math CRCT</td>
<td>Departmentalized</td>
<td>1182</td>
<td>841.52</td>
<td>40.19</td>
</tr>
<tr>
<td>2010 Math CRCT</td>
<td>Traditional</td>
<td>966</td>
<td>839.97</td>
<td>42.28</td>
</tr>
<tr>
<td>2008 Math CRCT</td>
<td>Departmentalized</td>
<td>1182</td>
<td>834.70</td>
<td>29.05</td>
</tr>
<tr>
<td>2008 Math CRCT</td>
<td>Traditional</td>
<td>966</td>
<td>838.03</td>
<td>29.59</td>
</tr>
</tbody>
</table>

Note. n = total number of students.

In order for the results of the ANCOVA to be generalized to the population of interest (all elementary schools with traditional or departmentalized settings), several modeling assumptions must be verified. The errors for the ANCOVA should be normally identically distributed (NID) with mean 0 and constant variance $\sigma^2$. The appearance of a moderate departure from normality does not necessarily imply a serious violation of the assumptions. The model requires independent observations. Because the math CRCT is a high stakes test with utmost attention given to proctoring and proper scoring, it is safe to assume that scores are independent. Figure 15 displays a normal probability plot of the 2010 math CRCT residuals for the ANCOVA.
Figure 15. Normal Q-Q plot of 2010 math CRCT.

The residuals fall close to the line for most values indicating the normality of errors. The upper tail does display a departure from the line. This can be explained by the fact that the CRCT has a maximum value and the highest scores are lower than expected for normally distributed data. The F statistic is only slightly affected because the test statistic is robust to the normality assumption (Montgomery, 2009). Figures 16 and 17 present histograms of the 2008 and 2010 math CRCT scores by setting. The data were graphed as histograms with normal curves to assess the range and the degree to which the data were distributed normally. The 2008 and 2010 math CRCT scores are
slightly skewed to the right when analyzed by setting, but these values do not lead to the conclusion that the assumption of normality is violated.

Figure 16. Histogram of 2008 math CRCT scores.
Figure 17. Histogram of 2010 math CRCT scores.

The ANCOVA was performed using SPSS. An ANCOVA has the same modeling assumptions as ANOVA with the additional requirements: (a) there must be a linear relationship between the covariate (2008 math CRCT) and the response (2010 math CRCT) and (b) the regression slopes must be equal for each treatment group (Montgomery, 2009). The scatterplot and statistical analysis of math CRCT scale scores indicate that the additional requirements of an ANCOVA have been met. SPSS was used to generate the scatterplot to test for the linearity assumption depicted in Figure 18. The dependent variable (2010 math CRCT scores) was used as the y-axis, and the covariate
(2008 math CRCT scores) was used as the x-axis. The general distribution of scores pointing upwards and to the right indicates a positive linear relationship for each group.

\[ F(1, 2144) = 4.81, \ p = 0.028, \ \eta^2 = .002. \]

This indicates that the interaction of setting and 2008 Math CRCT is statistically significant at the \( \alpha = 0.05 \) level. Because the estimated effect size is only 0.2%, it is safe to assume that the interaction has very little effect on the response variable, 2010 math CRCT.

\textit{Figure 18.} Scatterplot of 2010 math CRCT scale scores versus 2008 math CRCT scale scores.

The assumption of homogeneity of regression slopes was tested by including the interaction term in the general linear model. The interaction of setting and 2008 math CRCT yields \( F(1, 2144) = 4.81, \ p = 0.028, \ \eta^2 = .002. \) This indicates that the interaction of setting and 2008 Math CRCT is statistically significant at the \( \alpha = 0.05 \) level. Because the estimated effect size is only 0.2%, it is safe to assume that the interaction has very little effect on the response variable, 2010 math CRCT.
The general linear model was analyzed with only the main effects, setting and 2008 math CRCT, without the interaction term. The covariate, 2008 math CRCT, proves to be a significant predictor for 2010 math CRCT with $F(1, 2145) = 2544.90, p < 0.001, \eta^2 = .543$. This indicates that the inclusion of 2008 math CRCT explains 54.3% of the variation in 2010 math CRCT scores. The experimental factor of school setting is also a significant predictor for 2010 math CRCT with $F(1, 2145) = 21.64, p < .001, \eta^2 = .01$ at the $\alpha = .05$ level. This result indicates that even though setting produces a statistically significant difference in 2010 math CRCT scores, the estimated effect size is very small. Only 1% of the variation in 2010 math CRCT scores is explained by school setting. The observed power of .996 indicates that if the parameters are as expected, the null hypothesis will be rejected 99.6% of the time that this experiment is conducted.

Table 10 shows the adjusted mean and confidence intervals after the removal of the effect of the covariate.

<table>
<thead>
<tr>
<th>Setting</th>
<th>Mean</th>
<th>Standard Error</th>
<th>95% Confidence Interval</th>
</tr>
</thead>
<tbody>
<tr>
<td>Departmentalized</td>
<td>843.36</td>
<td>0.81</td>
<td>Lower Bound</td>
</tr>
<tr>
<td>Traditional</td>
<td>837.73</td>
<td>0.90</td>
<td>841.77</td>
</tr>
</tbody>
</table>

The parameter estimates for the math ANCOVA indicate an estimate of 5.63. This indicates that, on average, a student in the departmentalized setting scores 5.63 points higher on the 2010 Math CRCT than a student in the traditional setting when accounting for 2008 Math CRCT scores.
The equality of variance assumption was tested statistically using Levene’s test. At the $\alpha = .05$ level $F(1, 2146) = 1.07$, $p < .301$, there is not a statistically significant difference. The insignificant results of this test indicate insufficient statistical evidence that the error variances are unequal. The scatterplot matrix depicted in Figure 19 shows that variances of the residuals versus predicted values are approximately equal. Based on both the significance tests and plots, the assumption of equality of variance is met.

![Figure 19. Scatterplot matrix of predicted residuals versus predicted values.](image)

After analyzing the results of the second ANCOVA, the null hypothesis of no difference in the mean math CRCT scores was rejected. A statistically significant difference exists in mean math CRCT scale scores based on setting.

**Summary**

Exploratory data analysis was conducted and descriptive statistics were computed for 2010 reading and math CRCT scores for each comparison group. Assumptions were tested using appropriate statistical analyses. ANCOVAs were conducted using 2008
reading and math CRCT achievement data as a covariant to control for previous achievement against 2010 reading and math CRCT achievement data. Statistical significance was determined based on an alpha of $\leq .05$. Statistical analysis of data resulted in the rejection of both null hypotheses indicating that a statistically significant difference exists in 2010 mean reading and math scores based on setting. Caution should be used when interpreting the results of the ANCOVA because decreased power in the analysis of reading data increases the likelihood of a type I error, rejecting the null hypothesis when it is actually true. Chapter 5 contains a summary of the previous chapters and a discussion of these findings including their significance in education as well as recommendations for practical application and future research.
CHAPTER FIVE: SUMMARY AND DISCUSSION

Introduction

The purpose of the current non-experimental quantitative study was to examine whether a statistically significant difference in 2010 CRCT mean reading and math scale scores existed among fifth grade students who received instruction in a departmentalized setting as opposed to fifth grade students who were taught in a traditional setting. For the purpose of this study, departmentalized settings are settings in which teachers teach in their area of specialization and students move from one classroom to another for instruction. In this setting students have more than one teacher for core subjects, and each teacher is responsible for a specific subject or group of subjects. A traditional classroom setting is one where a single teacher is responsible for all core content areas for a particular group of students for the entire school year.

Chapter 5 provides a summary of the research and includes a discussion of the findings. Implications for practical and research applications are also discussed. Limitations of the current study are identified, and recommendations for future research are presented.

Summary of the Study

Statement of the problem and purpose. With the passage of NCLB (2001), each state became responsible for creating an accountability system to include yearly assessments of children’s academic achievement and measurable goals aimed at achieving adequate yearly progress. Georgia’s answer to the NCLB mandated accountability system was to require all public school systems in the state to assess
content areas of reading, English/language arts, and mathematics annually in grades one through eight. The A+ Education Reform Act of 2000 amended Georgia law and requires that students in grades one through eight be assessed using the CRCT. (Georgia Department of Education, 2010b).

NCLB (2001) mandates highly qualified teachers in core subject areas at the elementary level. The traditional organizational structure of elementary schools, a setting where one teacher provides instruction in all content areas to a class of students, requires teachers to act as generalists accountable for providing expert instruction in all content areas (Andrews, 2006; Chang et al., 2008; Gerretson et al., 2008; Hampton, 2007; Hood, 2010; McGrath & Rust, 2002). Reys & Fennell (2003) posited that it is unrealistic to expect elementary teachers to have specialized knowledge to facilitate mathematics instruction, as well as knowledge for every other subject they teach.

Studies on the topic of the impact of organizational setting on student achievement have been conducted, but their findings do not provide consistent evidence that one organizational structure is more effective than the other (Becker, 1987; Chang et al., 2008; Contreras, 2009; Dropsey, 2004; Hampton, 2007; Harris, 1996; Hood, 2010; Lamme, 1976; Page, 2009).

**Literature review.** The literature review included literature on student achievement, organizational structure, reading development, and math development. The socio-cognitive theory, constructivism, and the social constructivist theories were selected as the underpinning frameworks for the research study and were discussed in the literature review. These theories were chosen to link the importance of the setting in which students learn with their acquisition and development of knowledge.
The literature review on organizational structure revealed conflicting findings in determining the impact of organizational structure on student achievement. Previous studies found no particular organizational structure significantly impacted student achievement (Becker, 1987; Braddock et al., 1988; Des Moines Public Schools, 1989; ERIC, 1970; Hampton, 2007; Hood, 2010; Jackson, 1953; McPartland, 1987; Morrison, 1968; Page, 2009). Other studies on the same topic revealed statistically significant differences in student achievement based on organizational structure (Chang et al., 2008; McGrath & Rust, 2002; Moore, 2008; Williams, 2009). While opinions on how to best implement departmentalized settings were plentiful in the examined literature, empirical studies on the impact of those settings on student achievement were scarce.

**Overview of methodology.** The participants in the study were selected from the Pioneer RESA district in northeast Georgia. The RESA serves fourteen school systems with a total of 59 elementary schools (Pioneer RESA, 2010). To determine the student population of each elementary school within the RESA district, the researcher accessed data available on the GAOSA website. The total population of each school was computed to arrive at a RESA fifth grade student population of approximately 5,371 (GAOSA, 2010). Twenty-nine schools containing fifth grade classrooms within the Pioneer RESA district served as the convenience sample for the study.

A survey was created by the researcher and emailed to 36 administrators of elementary schools in the Pioneer RESA district. The researcher used the results of this survey to identify groups for the study. Students were sorted into two groups (a) students who received instruction in a departmentalized setting and (b) students who received instruction in a traditional setting. The departmentalized setting group consisted of 16
schools with a total fifth grade student population of approximately 1,186. The traditional setting group consisted of 13 schools with a total fifth grade student population of approximately 966. The sample was comprised of a total of approximately 2,152 fifth grade students.

Schools’ demographics, including (a) gender, (b) ethnicity, and (c) disaggregated categories (ED, SWD, LEP, and Gifted) were analyzed, and descriptive data were reported. All schools included in the study contained similar demographics. Student achievement scores on the reading and math CRCT were the dependent variables for the study. Achievement was measured using archival data from the 2010 Georgia CRCT results. A causal-comparative design was used in this quantitative study to determine if there was a statistically significant difference in student achievement on the reading and math portions of the 2010 Georgia CRCT based on organizational structure.

Parametric statistics utilizing ANCOVA were computed using archival data from the reading and math sections of the 2010 administration of the CRCT to determine whether the mean scores of the two groups significantly differed. Assumptions were tested using appropriate statistical analyses. Statistical significance was determined for both hypotheses based on an alpha of ≤ .05.

To examine the impact of organizational setting on student achievement, the current study incorporated two research questions. The hypotheses were tested using archival data from the reading and math sections of the 2010 administration of the CRCT. For the purpose of the current study, the research questions, hypotheses, and null hypotheses are as follows:
Research Question #1: Is there a difference in fifth grade mean reading achievement scale scores on the 2010 CRCT among students who received instruction in departmentalized settings as opposed to those who received instruction in traditional settings?

Hypothesis #1: There is a statistically significant difference in students’ fifth grade mean reading achievement scale scores as measured by the 2010 CRCT based on organizational structure (traditional vs. departmentalized) when 2008 reading CRCT scores are used as a covariate.

Null Hypothesis 1-\( H_{01} \): There is no statistically significant difference in students’ fifth grade mean reading achievement scale scores as measured by the 2010 CRCT based on organizational structure (traditional vs. departmentalized) when 2008 reading CRCT scores are used as a covariate.

Research Question #2: Is there a difference in fifth grade mean math achievement scale scores on the 2010 CRCT among students who received instruction in departmentalized settings as opposed to those who received instruction in traditional settings?

Hypothesis #2: There is a statistically significant difference in students’ fifth grade mean math achievement scale scores as measured by the 2010 CRCT based on organizational structure (traditional vs. departmentalized) when 2008 math CRCT scores are used as a covariate.

Null Hypothesis 2-\( H_{02} \): There is no statistically significant difference in students’ fifth grade mean math achievement scale scores as measured by the 2010 CRCT based on...
organizational structure (traditional vs. departmentalized) when 2008 math CRCT scores are used as a covariate.

Results of the analyses found a significant difference in 2010 mean reading and math CRCT scale scores based on organizational structure. The findings of the current study indicate that organizational structure does significantly impact student achievement when controlling for previous achievement; however, small effect sizes in each ANCOVA (.3 and .2) indicate that the independent variable (organizational structure) has very little effect on the dependent variables (2010 reading and math CRCT scores).

Based on these findings, it can be assumed that other variables affect student achievement more than organizational structure. The mean reading and math achievement scale scores on the 2010 CRCT did vary significantly between groups based on organizational structure; therefore, the results of the study support the rejection of both null hypotheses.

**Discussion of the findings.** The findings of the current study are in opposition with previous studies that failed to find a significant difference in student achievement based on organizational structure (Becker, 1987; Braddock et al., 1988; Des Moines Public Schools, 1989; ERIC, 1970; Hampton, 2007; Hood, 2010; Jackson, 1953; McPartland, 1987; Morrison, 1968; Page, 2009). The findings of the current study are consistent with other studies on the impact of organizational structure on student achievement (Chang et al., 2008; McGrath & Rust, 2002; Moore, 2008; Williams, 2009).

McGrath & Rust (2002) and Garner & Rust (1992) concluded that students in traditional settings gained significantly more than their counterparts in departmentalized settings. These results are consistent with the current study because a statistical
difference in achievement scores was reported based on organizational structure. Gerretson, et al. (2008) reported that teachers in departmentalized settings provided more effective classroom instruction, positively impacting student achievement.

The findings of the current study concur with Moore’s (2008) conclusions. While Moore’s study indicated a significant difference in student achievement based on organizational structure did not exist in other content areas, a significant difference was found in fifth graders’ math achievement scores based on organizational structure. As in the current study, students in Moore’s study who received instruction in departmentalized settings scored higher in math than fifth graders who received instruction in traditional settings.

Results of the current analysis indicate a 5.63 increase in students’ math achievement. Because today’s schools are accountable for meeting AYP, every point used to measure achievement is significant. The findings of the study related to the second research question validate Rey & Fennell’s (2003) argument that students who receive math instruction by content specialists achieve at a higher rate. The 1.89 point increase in students’ reading achievement indicated by the results of the current study are not considered practically significant, although the null hypothesis was rejected. The likelihood of a type 1 error in the reading ANCOVA directly questions the validity of the results of that test; therefore, the reliability of its results are questionable.

The results of the current study are consistent with Williams’ (2009) finding that student achievement was positively impacted by organizational structure. Williams’ study indicated the departmentalized setting had a greater percentage of students achieving at the exceeds level on the 2007 administration than the traditional setting, but
those findings cannot be generalized to the current study. Williams’ study sought to
determine whether a difference in student performance levels existed based on setting.
The current study examined the difference in mean achievement scores based on setting
and reported a significant finding. The current study did not disaggregate results to
determine the meets and exceeds percentages of students in the study.

Implications and Discussion

After performing statistical analysis of data, the researcher was able to answer the
two research questions and conclude that there is a difference in fifth grade reading and
math mean achievement scale scores on the 2010 CRCT among fifth grade students who
received instruction in departmentalized settings as opposed to those who were taught in
traditional settings. The results of the math ANCOVA are more valid than the results of
the reading ANCOVA. Quantitative evidence in support of departmentalization of
elementary grades in the current study helps answer the question of why the topic of
reorganizing elementary schools continues to be debated. Based on the review of
literature and the current study’s finding, there is an implication that conversations about
the implementation of departmentalized settings are contingent on teachers seeking to
improve student achievement while reducing the number of core content areas they are
responsible for teaching. Perhaps administrators and teachers continue to consider and
implement departmentalization of elementary classrooms because of a perception of
minimizing the pressure of accountability in the high-stakes testing era by reducing the
number of core subjects teachers are required to teach. Findings of the current study
validate this perception.
The culture, curriculum, and assessment practices in today’s elementary schools differ greatly from those of three decades ago when discussions about the reorganization of schools began to gain popularity. Today, broad statements in support of departmentalization abound in schools. In terms of the current study it is possible to conclude that this practice is suited for elementary schools where it is implemented with the assumption that student achievement will be positively impacted. Although results of the current study align with those from a limited number of historical studies on the same topic, researchers and educational leaders should use caution when generalizing those results to all elementary settings.

The current study analyzed student achievement scores in reading and math based on organizational structure for the purpose of providing administrators and educators quantitative evidence to support or refute reorganization of upper elementary school grades so that optimum learning environments could be created. Piaget (1952) and Vygotsky (1978) theorized that setting and environment are critical components and significantly impact children’s acquisition of knowledge. In terms of the current study, physical setting and environment as related to organizational structure have a positive impact on student achievement, suggesting that teachers should focus on implementing constructivist and socio-culture theories to create learning environments that foster personal development and social emotional needs of students, regardless of the organizational structure that is implemented.

The current study provides conclusive evidence that administrators should employ teachers as content specialists. However, this practice should be more seriously considered in the math content areas based on the five-point difference in mean math
achievement scores in the departmentalized setting and the limitations of the results of
the reading ANCOVA. A five point increase in math achievement could result in
students passing the state mandated assessment in that content area and/or schools
achieving AYP.

The current study is unique from other relevant studies on this topic in that a
causal-comparative design was implemented to determine the effect of the independent
variable (departmentalized or traditional setting) on the dependent variables (reading and
math achievement) while controlling for previous academic achievement. Conclusive
evidence that a statistically significant difference exists in student achievement based on
organizational structure, especially in math, adds to the field of existing research by
providing more evidence of the validity of utilizing departmentalized classrooms at the
elementary level.

The current study further adds to the field of existing research by adding current
quantitative analysis of standardized test scores in different organizational settings to
determine the impact of these settings on student achievement. Most of the existing
studies on this topic were conducted three decades ago when the middle school concept
surfaced and before NCLB led to standards-based instruction and standardized testing.
The current study was conducted in a setting that is required to use standardized
curriculum and assessment methods.

Limitations

Limitations surfaced as the study was conducted. An obvious limitation of the
current study is that a type I error is likely in the ANCOVA of reading data. A type I
error occurs when the null hypothesis is rejected when it is, in fact, true. Although
stabilizing transformations in data were conducted, they failed to reduce the variance in
the dependent variable. A statistically significant difference was reported in reading
mean scale scores, but low power (66%) indicates that the null hypothesis may have been
incorrectly rejected. Small effect size in each ANCOVA (.3 in reading, and .2 in math)
indicates that only a small percentage of the variation in scores was explained by setting.
This implies that other variables not identified by the current study positively impacted
student achievement.

Although a few previous studies examined the impact of instructional strategies
used in different organizational structures (Gerretson et al. 2008; McPartland, 1987), the
current study was limited in that instructional strategies used by teachers were not
considered. Teacher preference to particular content areas was also not a consideration.
While all teachers from schools represented in the study were required to use the GPS as
the basis of their curriculum, there was no consideration in the variety in resources
available to support their instruction. The current study did not consider the effect of
specialized training or professional development in specific content areas; nor, was there
a consideration of the effect of teachers’ experience, certification level, or effectiveness
on academic achievement.

The current study did not consider the fact that many students who participated in
the administration of the 2010 CRCT may have received additional instruction in a
resource setting or co-teaching environment. Students could have also received
instruction from support staff in addition to their regular classroom teacher’s instruction,
regardless of the setting, as part of the school’s response to intervention (RTI) time, early
intervention program (EIP), or tutoring programs. These confounding variables serve as
a limitation in the current study because extra instructional opportunities could have affected individual students’ scores.

Data from one grade level were analyzed; therefore, the results of this study may not be generalized to other grade levels. Although a large sample was used in the current study, results could have been different if more grade levels were included in the study. Finally, another limitation of the current study is that data from only two core content areas were analyzed. The current study focused on reading and math achievement because fifth graders in Georgia are required to pass those content areas in order to be promoted to sixth grade. Further study of other core academic areas could produce different results.

Recommendations

Recommendations for practical application. NCLB requires teachers to be deemed highly qualified in all subjects they teach. Allowing teachers to provide instruction in fewer content areas requires examination of organizational structure. Based on the findings of the current study, utilizing a departmentalized setting where teachers serve as content specialists, especially in math, positively impacts student achievement. The findings of the current study suggest that it would be beneficial for teacher preparation programs and professional development opportunities to be designed to focus on specialization of content and designing quality instruction in specific content areas.

Vygotsky (1978) theorized that children’s social interaction plays a fundamental role in the development of cognition; therefore, in light of the current research, elementary classroom teachers who choose to departmentalize should focus of providing students with socially rich environments where students can interact with peers and
teachers to develop cognition. In the constructivism theory, Piaget (1952) posited that children construct knowledge based on interactions with their environment and as a result of personal experience. With the current research in mind, departmentalized settings should be designed with a focus on providing meaningful learning experiences through high quality instruction that allows children to develop knowledge and skills needed for the acquisition of learning in the public school setting.

Parents of elementary students would be wise to question whether their children’s personal, social, and academic needs are being met in departmentalized settings. Findings of the current study may result in generalized opinions about the implementation of departmentalized setting, and parents of elementary students who are concerned about this trend in elementary schools should be informed of the limitations of such practice.

**Recommendations for future research.** High-stakes testing and increased accountability measures in public schools have caused educational stakeholders to examine variables that impact student achievement. One of these variables is organizational structure. While the current study reported a definite relationship between organizational structure and student achievement, specifically in math, this relationship was small. Future research should be conducted to more closely examine variables that impact student achievement. This is supported by the conflicting findings of similar studies. Student achievement is complex, and research could be conducted on a plethora of variables including but not limited to (a) teacher effectiveness, (b) teacher preparation, (c) professional development, (d) resources, (e) instructional strategies, and (f) school
climate. The administrator survey used in the current study could be expanded in future studies to include questions about these variables.

Over the past three decades, studies have been conducted on the effect of organizational structure on student achievement. A majority of these studies are outdated and did not provide conclusive evidence that one organizational structure impacts student achievement more than another (Alspaugh, 1998; Alspaugh & Harting, 1995; Becker, 1987; Braddock et al., 1988; Contreras, 2009; Des Moines Public Schools, 1989; ERIC, 1970; Hampton, 2007; Hood, 2010; Jackson, 1953; McPartland, 1987; Morrison, 1968; Page, 2009). The current study, as well as studies referenced herein, used quantitative methods to analyze student achievement. Conducting future research that implements a qualitative design could allow researchers to analyze additional variables within various organizational structures to determine factors that have a definite impact on student achievement (Moore, 2008). Another plausible area for future research is analysis of the implementation of specific resources with fidelity within different organizational settings.

Relevant research fails to consistently consider the effect of instructional strategies, teacher preparation, and professional development opportunities implemented in various organizational settings (Patton, 2003). Future research should examine instructional strategies used in various settings and establish comparison groups based on these variables. The current study affirms that increased student achievement in math is one benefit of departmentalization. Future studies on additional benefits of implementing alternative organizational structures should be conducted. Because the validity of the reading ANCOVA in the current study is in question, future study on the impact of organizational structure on reading achievement should be conducted. Some current
studies have reported significant findings in math achievement (Moore, 2008; Ponder, 2008; Williams, 2009), but none of the studies examined by this researcher concluded that increased reading achievement in a benefit departmentalization in elementary grades.

Proponents (Becker, 1987; Chang et al., 2008; Dropsey, 2004; Harris, 1996; Lobdell & Van Ness, 1963) of traditional settings argue that students’ social and emotional needs are better met in settings where students can develop meaningful relationships with peers and teachers with whom they are more familiar. Conducting future study on the topic of the impact of organizational structure on students’ emotional and social development is recommended.

The current study can serve as a starting place for research in northeast Georgia on variables that impact student achievement. It should be replicated and expanded upon in the same setting so that conclusions about confounding variables could be made using the same sample. The study could also be replicated in similar settings to examine whether students in different geographical regions achieve higher based on setting.

Departmentalized settings have many definitions, and they are organized differently in various schools (Chan & Jarman, 2004; Chang et al., 2008; Dropsey, 2004; Gerretson et al., 2008; Hood, 2010; McGrath & Rust, 2002; Moore, 2008; Reys & Fennell, 2003). An area for future research is to define these different settings and formulate comparison groups based on those definitions. Using these definitions, empirical research should be conducted to further examine the relationship of organizational structure and student achievement.

Conclusions
Fifth grade students in the current study who received instruction in a departmentalized setting achieved a higher mean score on the 2010 reading and math portions of the CRCT than fifth grade students who received instruction in a traditional setting. Higher mean scores were evident in math than in reading. A type I error in the reading ANCOVA leads to cautious interpretation of the results. The current study adds to the existing body of research on organizational structure by providing quantitative evidence that students achieve higher scores when they receive instruction from a teacher who serves as a content specialist.

Undoubtedly increased student achievement will remain the primary goal of public schools. Determining factors that can be successfully implemented with this goal in mind requires that diligent research be conducted on myriad variables. Conroy, Stichter, Daunic, and Haydon (2008) wrote:

Classrooms are complex environments that include a host of dynamic, intersecting variables, such as classroom-setting factors (e.g., classroom arrangement), instructional strategies (e.g., use of scaffolding), and individual student factors (e.g., ability, skill level), with the overall goal of producing positive student outcomes. Needless to say, capturing how these variables interconnect and the relative influence they have on student outcomes is difficult. (p. 209).

While researchers may never be able to isolate a single factor that impacts student achievement, they should not forego substantive studies that attempt to provide insight into answering the question of how best to teach today’s students.
REFERENCES


Georgia Department of Education. (n.d.). *What Georgia educators need to know about Georgia’s testing program*. Atlanta, GA: Author.


APPENDIX A: INSTITUTIONAL REVIEW BOARD APPROVAL

IRB Application 1075.042911: Effects of Departmentalized versus Traditional Settings on Fifth Graders' Math and Reading Achievement
IRB, IRB

Sent: Friday, April 29, 2011 12:06 PM
To: Yearwood, Connie B
Cc: IRB, IRB; Michael-Chadwell, Sharon D; IRB, IRB
Attachments: Annual Review Form.doc (31 KB) [Open as Web Page]; Change in Protocol.doc (29 KB) [Open as Web Page];

Good Afternoon Connie,

We are pleased to inform you that your above study has been approved by the Liberty IRB. This approval is extended to you for one year. If data collection proceeds past one year, or if you make changes in the methodology as it pertains to human subjects, you must submit an appropriate update form to the IRB. Attached you’ll find the forms for those cases.

Thank you for your cooperation with the IRB and we wish you well with your research project. We will be glad to send you a written memo from the Liberty IRB, as needed, upon request.

Sincerely,

Fernando Garzon, Psy.D.
IRB Chair, Associate Professor
Center for Counseling & Family Studies

(434) 592-5054

LIBERTY UNIVERSITY

40 Years of Training Champions for Christ: 1971-2011
APPENDIX B: PERMISSION REQUEST TO RESA DIRECTOR AND BOARD
OF CONTROL

Connie Yearwood, Doctoral Candidate
Liberty University
Lynchburg, VA

March 16, 2011

XX. XXXXX XXXXX, Executive Director, and Board of Control
Pioneer RESA
XXXX Hwy. XXX
XXXXXXXXXX, XX XXXXX

Dear XX. XXXXX and Board of Control,

I am currently a doctoral candidate in the Teaching and Learning degree tract at Liberty University in Lynchburg, VA. For my dissertation I have successfully defended a proposal to conduct a study in the Pioneer RESA district to determine whether there is a difference in reading and math achievement scores of fifth grade students based on the organizational structure (traditional or departmentalized settings) as evidenced by the results of the 2010 Georgia CRCT.

I respectfully request your permission to contact the RESA analysts and to get data directly from them. My research design includes analyzing the 2008 and 2010 CRCT reading and math scores of fifth grade students from schools in the Pioneer RESA district who agree to participate in the study.

Upon your request I will share the results of the study with you and other interested personnel at the conclusion of the research study.

Your permission and support are crucial to the success of this study. Thank you in advance for your consideration. You may reach me at (XXX) XXX-XXXX; (XXX) XXX-XXXX, or by email at cyearwood@xxxxxxxxx.xxx.xx.xx if you have any questions. I look forward to and await your written response.

Sincerely,
Connie Yearwood
March 25, 2011

Ms. Connie Yearwood

Dear Ms. Yearwood:

As per your request, on March 16, 2011, the Pioneer RESA Board of Control approved a motion authorizing our Department of Evaluation and Assessment to provide you with data and reports necessary for research you propose to conduct relative to your doctoral studies. The specific motion approved by the Board of Control reads as follows:

Motion to approve requests for Pioneer RESA to provide regional non-confidential reports for dissertation research as requested by:

County School System and Doctorial Student at College and by Ms. Connie Yearwood, Administrator in the County School System and Doctorial Student at Liberty University.

Pioneer RESA looks forward to working with you in this undertaking. The outcome of your research will be of interest to Pioneer RESA. Your contact in this matter will be Coordinator of Evaluation and Assessment at Pioneer RESA. He may be reached by phone at or by email at

Please contact me if you have questions or if I can be of assistance.

Sincerely,

cc:
Dear Administrator,

As a student at Liberty University, I am conducting a research study the Pioneer RESA district to fulfill the requirements of my Ed. D. degree. The topic of the study is the effect of departmentalized and traditional settings on 5th graders’ reading and math achievement. Attached you will find an informed consent form. Your response to this email implies consent.

Will you please reply to this email with the answer to the following two questions?

1. Did your school use departmentalized or traditional structure in 5th grade during the 2009-10 school year?

2. Did your school use departmentalized or traditional structure in 3rd grade during the 2007-08 school year?

* A departmentalized setting is one where teachers teach in their area of specialization and students move from one classroom to another for instruction. In this setting students have more than one teacher for core subjects, and each teacher is responsible for a specific subject or group of subjects. A traditional classroom setting is one where a single teacher is responsible for all core content areas for a particular group of students for the entire school year.

Thank you,

Connie Yearwood
(XXX) XXX-XXXX
FAX: (XXX) XXX-XXXX
cyearwood@XXXXXXX.XXX.XX
ecbyearwood@XXXXXXX.XXX
APPENDIX E: INFORMED CONSENT FORM

Effects Of Departmentalized Versus Traditional Settings On Fifth Graders' Math And Reading Achievement
Connie Yearwood, Doctoral Candidate
Liberty University
School of Education

You are invited to be in a research study on the effect of organizational structure on student achievement. You were selected as a possible participant because your school is in the Pioneer RESA district, and elementary schools in this district serve as the sample for this study. I ask that you read this form and ask any questions you may have before agreeing to be in the study.

This study is being conducted by: Connie Yearwood, Doctoral Candidate
Liberty University
Lynchburg, VA

Background Information

The purpose of this study is to determine whether fifth grade students who received reading and math instruction in a departmentalized setting achieved higher scores on the 2010 CRCT than fifth grade students who received reading and math instruction in a traditional setting. A departmentalized setting is one where teachers teach in their area of specialization and students move from one classroom to another for instruction. In this setting students have more than one teacher for core subjects, and each teacher is responsible for a specific subject or group of subjects. A traditional classroom setting is one where a single teacher is responsible for all core content areas for a particular group of students for the entire school year. The focus of the study is 2010 reading and math CRCT data. To determine equivalency of groups before students were introduced to departmentalization, 2008 reading and math CRCT data will be analyzed.

 Procedures:

If you agree to be in this study, I would ask you to do the following things:

1) Return a signed informed consent form to the researcher (Connie Yearwood)
2) Answer and return in a brief survey to the researcher for the purpose of identifying the type of organizational structure utilized in your school.

The results of the study will be used to establish groups for the study: (a) students from schools that utilize departmentalization and (b) students from schools that utilize traditional classroom settings.
Risks and Benefits of being in the Study

The risks of participation in the study are no more than the participant would encounter in everyday life. Because archival data will be analyzed, the researcher will not come in direct contact with any participants. Data will be reported as assigned to arbitrary numbers; therefore, identification of participants will not be possible, reducing the risks associated with the research. Student names, teacher names, identification numbers or specific scores will not be disclosed.

The subjects in the study will not directly benefit from the study.

Confidentiality:

The records of this study will be kept private. Information that will make it possible to identify subjects or schools will not be included in any sort of published report. To maintain confidentiality, the researcher will assign arbitrary numbers to schools who elect to participate in the study. Identifying information will not be included in the tables or figures that may appear in the study results.

Research records will be stored securely and only the researcher will have access to the records. The researcher will maintain confidential records and keep informed consent documents for three years after completion of the proposed study even if the researcher terminates association with the University. After that period of time the documents will be destroyed by a document destruction agency.

Voluntary Nature of the Study:

Participation in this study is voluntary. Your decision whether or not to participate will not affect your current or future relations with Liberty University. If you decide to participate, you are free to refrain from answering any question or to withdraw at any time with out affecting those relationships.

Contacts and Questions:

The researcher conducting this study is Connie Yearwood. If you have questions, you are encouraged to contact Connie Yearwood at (706) 754-2442, (706) 886-2560, cyearwood@habersham.k12.ga.us. (Dissertation Committee Chairperson: Dr. Sharon Michael-Chadwell, Liberty University, (210) 241-2512, sdmichaelchadwell@liberty.)

If you have any questions or concerns regarding this study and would like to talk to someone other than the researcher, you are encouraged to contact the Institutional Review Board, Dr. Fernando Garzon, Chair, 1971 University Blvd, Suite 1582, Lynchburg, VA 24502 or email at fgarzon@liberty.edu.

Please retain this information for your records.