The Effects Of Departmentalized And Self-Contained Structures On Student Achievement

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THE EFFECTS OF DEPARTMENTALIZED AND SELF-CONTAINED STRUCTURES ON STUDENT ACHIEVEMENT

A Dissertation
Presented for the
Doctor of Philosophy
Degree
The University of Mississippi

by

CARRIE R. SKELTON

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ABSTRACT

The present study investigated the effects of departmentalized and self-contained classroom structures on student achievement of fourth, fifth, and sixth grade students in Mississippi schools. Historical MCT2 proficiency level percentages were collected from the Mississippi Department of Education website for the following school years: 2009-2010, 2010-2011, 2011-2012, and 2012-2013. This data was used to calculate a revised Quality of Distribution Index (QDI-R) for each school included in the study. Using the QDI-R, differences were generated between school year (SY) 2009-2010 and SY 2010-2011; between SY 2010-2011 and SY 2011-2012; and between SY 2011-2012 and SY 2012-2013. This yielded three data points for measuring student achievement in the study.

An email questionnaire was distributed to schools in order to determine which structure was being utilized in each school for each grade level. Follow up phone calls were made to those failing to respond to the email request. Once this information was collected, the population of the study included 247 schools serving fourth grade, 242 schools serving fifth grade, and 207 schools serving sixth grade.

A one-way Multivariate Analysis of Variance (MANOVA) was conducted for determining if a difference existed between the two structures for each grade level. Findings revealed no significant difference between structures in language arts for grades four, five, or six. There was also no evidence of a significant difference between structures for grade four and five mathematics. A significant difference was found between the two structures for grade six mathematics.
DEDICATION

For my grandmother, Mrs. Cassie Skelton

For my mother, Ms. Janet Skelton

For my dearest friend, Ms. Summer Pannell
ACKNOWLEDGEMENTS

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the intimidating thought of writing and defending a dissertation. Summer believed in me when I did not believe in myself. She was there for those days when I felt like quitting, encouraging me to keep going. She will never know the amount of gratitude, appreciation, and admiration I feel for her.
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CHAPTER ONE

Introduction

The following study compares the percentage differences of departmentalized classroom structures and self-contained classroom structures on student academic performance in grades four, five, and six. The goal is to help understand the relationship between classroom instructional structure and improved student achievement. Because standardized testing results have become the focal point in determining a school’s success or failure since the inception of No Child Left Behind (NCLB), investigating the impact of the two instructional structures on student achievement yields beneficial information for school leaders.

Due to sanctions imposed on school districts by the federal and state governments, school leaders are constantly evaluating operational systems and organizational structures to determine the most effective means of helping students meet required standards. The classroom organizational structure is an issue facing school administrators each year (Rogers, 2012). In a self-contained classroom, a group of students are instructed by a single teacher for the majority, if not the entirety, of the instructional day. From this single teacher, students receive instruction in reading, grammar, math, science, and social studies. In this setting, non-core courses such as physical education and fine arts are often, but not always departmentalized. These non-core subjects are taught by teachers specializing in this content area (Welbourne, 2005).

Departmentalization came about in the early twentieth century, typically in grades seven through twelve (Liu, 2011). In a departmentalized setting, the core subjects (reading, mathematics, language arts, science, and social studies) are typically taught by different teachers.
Departmentalization may consist of a different teacher for each subject, or students transitioning to different teachers who provide instruction in multiple subjects (Rogers, 2012). Although there has been experimentation with departmentalization in lower grades, the self-contained structure is most utilized in elementary classrooms.

Education has been a topic of emphasis in the United States since colonial times. According to the United States Department of Education (2012), states and communities, public and private organizations, have the responsibility of establishing schools and colleges, developing curricula, and determining requirements for enrollment and graduation. In 1867, Andrew Johnson signed legislation creating the first U.S. Department of Education for collecting information on schools and teaching to help states establish effective school systems. Because of fears the Department of Education would exercise too much control over local schools, the department was demoted to the Office of Education in 1868 (Murphy, 1997). In October 1979, President Jimmy Carter signed into law the Department of Education Organization Act of 1979. The purpose of this law was to strengthen the federal commitment to ensuring equal educational opportunities for every individual (Department of Education Organization Act of 1979).

Measuring the effectiveness of school systems eventually led to the idea of national assessments. From this idea, the National Assessment of Educational Progress (NAEP) was derived. The first national assessments were administered in 1969 to states electing to participate (National Assessment of Educational Progress, 2012b). Prior to 2001, state participation in NAEP testing was voluntary. However, in 2001, reauthorization of the Elementary and Secondary Education Act of 1965 (ESEA), also known as NCLB, required states receiving Title I funding to participate in NAEP in reading and mathematics at grades four and eight every two years (National Association of Educational Progress, 2012a). According to
NAEP (2012a), results are reported about subject-matter achievement, instructional experiences, and school environment for specified populations of students. Educators can then compare the knowledge and skills of their students with students in other states and across the nation.

In an effort to increase student achievement and meet federal guidelines set with each reauthorization of ESEA, the Mississippi performance-based accreditation system has received numerous overhauls; however, these attempts have done little to bolster relative student achievement. According to 2013 NAEP results, Mississippi ranks 51st of 51 in K-12 student achievement, dropping one notch lower from 2012 (Amy, 2014).

In 2001, the ESEA was reauthorized as the No Child Left Behind Act (NCLB). According to Rosenberg, Westling, and McLeskey (2012), NCLB mandates compliance to high achievement standards and sanctions states and schools failing to meet standards. The legislation also mandates students be assessed on state standards with the goal of reaching one hundred percent proficiency in reading and mathematics by 2014 (Dee & Jacob, 2011).

In response to the federal mandates set forth in NCLB, Mississippi began revising the language arts and mathematics state frameworks and began creating new assessments corresponding with the standards (MDE, 2012). The Mississippi Curriculum Test, Second Edition (MCT2) is based on the revised language arts frameworks of 2006 and the revised mathematics frameworks of 2007. According to the Mississippi Department of Education Office of Student Assessment (2014), the MCT2 is a measure of student achievement in language arts and mathematics in grades 3-8, serving as the basis for the state accountability model in these grades. The MCT2 was first administered to Mississippi students during the 2007-2008 school year.

The MDE Office of Student Assessment (2014) explains Performance Level Descriptors
(PLDs) provide information about expected level of student performance on the assessment. The PLDs are divided into four levels of increasing difficulty and complexity: Advanced, Proficient, Basic, and Minimal. The MDE Office of Student Assessment (2014) describes students labeled advanced as those who dependably perform beyond expectations required to be successful in the next grade level. Students ranging within the proficient category demonstrate expected mastery of knowledge and skills required for the next grade level. MDE contends students performing at the basic level exhibit limited grasp of knowledge and skills in the course and may experience lack of success at the next grade level. Students falling into the minimal category inconsistently accomplish mastery of knowledge or skills. Students scoring minimal need remediation in lacking knowledge and skills necessary for success at the next grade level (MDE, 2014).

Statement of the Problem

The purpose of this quasi-experimental design quantitative study is to compare student academic performance, measured by comparing Mississippi schools with self-contained classroom structures to those with departmentalized classroom structures. The study focuses on changes in percentage of MCT2 performance level in grades four, five, and six between school years (SY) 2009-2010 and 2010-2011, between SY 2010-2011 and 2011-2012, and between 2011-2012 and 2012-2013. Recent studies conducted on this topic focus on small sample sizes and/or one subject. Bingham (2011) conducted a study comparing the effect of the two structures on student achievement in mathematics using third grade test data from two similar Title I schools, one self-contained and one departmentalized. Results of Bingham’s study revealed self-contained students showed a higher percentage of meeting and exceeding standards than departmentalized students. Moore (2008) conducted a study using sixty-seven schools in Northeast Tennessee comparing the effect of school structure on student achievement in all
subjects. Findings in this study indicate no significant difference in self-contained and departmentalized students for fourth or fifth grade students in language arts, science, and social studies and no significant difference in fourth grade mathematics. There was a significant difference in scores for fifth grade mathematics indicating departmentalized is more effective at this grade level for this subject. Moore recommends conducting a similar study with a larger sample size, which may yield more generalizable results. This study adds to the current research because this study is comprehensive, incorporating all public fourth, fifth, and sixth grade classrooms in the state of Mississippi through a four-year longitudinal examination. This study and resulting comparison will aid school leaders in determining the most effective instructional structure for student achievement in Mississippi schools.

This study identifies the achievement differences among MCT2 performance levels for individual schools between SY 2009-2010 and SY 2010-2011. The differences were calculated for the following three school years, resulting in two additional data points for comparison. The measure of change was calculated by attaining the percentage of students scoring in each of the four performance levels according to the Mississippi Department of Education’s website. The performance differences, both positive and negative, were imported into a spreadsheet using SPSS, version 22. The differences were aggregated for each instructional model throughout the public schools of Mississippi. The population consists of 574 Mississippi public schools serving fourth, fifth, and/or sixth grade students. This amounts to all schools in Mississippi with achievement data for grades four, five, and six for all four school years of the study.

**Significance of the Study**

The Mississippi Department of Education has mandated and executed many changes in the education system since the passage of the Education Reform Act of 1982, including multiple
overhauls of the state accountability system, rewriting curriculum frameworks for language arts and mathematics, developing the more rigorous MCT2 student assessments, and placing more accountability on schools and districts for increasing student achievement. Although MDE has taken measures to increase student achievement, NAEP scores provide evidence Mississippi students continue to struggle academically. According to Amy (2014), Mississippi’s overall score in K-12 achievement was an F and the state ranked 51st of 51 in this category.

In an effort to increase student proficiency in reading and mathematics, school leaders are constantly searching for methods to improve student achievement. A number of researchers contend teachers will be more effective if they specialize in the subject areas they most enjoy (Chan & Jarman, 2004; Strohl, 2014). A small number of studies have revealed higher student achievement in the self-contained setting (Lamme, 1976; Harris, 1996). Other studies have shown no major differences in achievement of students in a departmentalized or self-contained classroom setting (Findley, 1966; Andrews, 2006; Taylor-Buckner, 2014).

The proposed study advances existing research by utilizing a unique context. This measure is the MCT2, a measure exclusive to Mississippi. Results of this study may assist school leaders in determining the most effective organizational classroom structure for maximizing student achievement in their school.

**Research Question**

For this study, the researcher sought to answer the following question: Is there a statistically significant difference when comparing student performance in self-contained classroom structures to students in departmentalized classroom structures in Mississippi schools measured by the aggregated differences in percentage of MCT2 performance levels in grades
four, five, and six between SY 2009-2010 and 2010-2011, between SY 2010-2011 and 2011-2012, and between 2011-2012 and 2012-2013?

Research Hypotheses

The potential numeric outcomes are numerous, but the primary research hypotheses are:

$H_{o1}$: There is no significant difference in fourth grade student performance in language arts when comparing students in self-contained classroom structures to students in departmentalized structures.

$H_{o2}$: There is no significant difference in fourth grade student performance in mathematics when comparing students in self-contained classroom structures to students in departmentalized structures.

$H_{o3}$: There is no significant difference in fifth grade student performance in language arts when comparing students in self-contained classroom structures to students in departmentalized structures.

$H_{o4}$: There is no significant difference in fifth grade student performance in mathematics when comparing students in self-contained classroom structures against students in departmentalized structures.

$H_{o5}$: There is no significant difference in sixth grade student performance in language arts when comparing students in self-contained classroom structures against students in departmentalized structures.

$H_{o6}$: There is no significant difference in sixth grade student performance in mathematics when comparing students in self-contained classroom structures against students in departmentalized structures.
Limitations of the Study

The major limitation of the study is the longitudinal data being utilized in determining effect of classroom organizational structure on student performance. Although the data spans a four year period, student growth residuals for fourth, fifth, and sixth grade classes throughout the population would be more applicable data for measuring impact of organizational structure on student achievement; however, MDE does not report student growth residuals by teacher. A second limitation of the study is when considering student achievement, teacher quality is not taken into consideration as a factor for an increase or lack of increase in student achievement. The study does not include data on teachers’ highly qualified status, years experience, regular attendance, or other attributes relevant to student achievement. With the exception of highly qualified status, this information is not publicly accessible data.

Another key limitation is the study lacks internal validity checks because it is limited to the classroom structures’ effect on student academic performance. The study fails to consider other variables such as student enrollment, average teacher salary, student population demographics, socioeconomic status, or school district millage rates; however, any of these variables may be contributing factors in the results of this study.

A fourth limitation is the study focuses only on the two main classroom organizational structures, departmentalized and self-contained. Structures such as team teaching or co-teaching, for the sake of this study, are to be classified under the departmentalized structure.

The fifth limitation of the study resides in the fact the data is limited to only fourth, fifth, and sixth grades. Because the researcher is including the entire population of schools in the state of Mississippi, along with four years of data for both language arts and mathematics, the sheer volume of data can lead to the data becoming unmanageable.
Another limitation of this study is the lack of inclusion of Mississippi’s recently adopted Common Core State Standards (CCSS). There is no emphasis placed on the new standards in this study because all data resulted from assessments prior to full implementation of CCSS in Mississippi schools.

**Definition of Terms**

**Adequate Yearly Progress (AYP):** Adequate yearly progress (AYP) is the measure by which schools, districts, and states are held accountable for student performance under Title I of the No Child Left Behind Act of 2001 (NCLB), the current version of the Elementary and Secondary Education Act. AYP, however, is not a new concept; it was introduced into federal law in the ESEA's 1994 reauthorization (Editorial Projects in Education Research Center, 2011).

**Criterion-referenced assessments:** An approach to testing in which an individual’s score on a test is interpreted by comparing it to a pre-specified standard of performance (Gall, Gall, & Borg, 2007).

**Education Reform Act of 1982:** The Education Reform Act of 1982 was a landmark piece of legislation passed by Mississippi Governor William Winter. The law mandated statewide public kindergarten, compulsory school attendance, higher standards for teacher and student performance, and the creation of a lay state board of education (JFK Library, 2008).

**Framework:** Competencies (required learning standards for all students) and objectives (learning outcomes indicating how the competencies can be fulfilled) approved by the State Department of Education (MDE, 2012).

**National Assessment of Educational Progress (NAEP):** NAEP is a congressionally mandated project under the U.S. Department of Education’s National Center for Education Statistics which collects and reports student performance in the United States. Commonly
referred to as the Nation’s Report Card, NAEP results includes representative samples of students at grades four, eight, and twelve on reading, mathematics, science, history, writing, and geography for elementary and secondary school students who attend both public and private school (Education.com, n.d.).

No Child Left Behind (NCLB): NCLB is a 2001 education reform law signed into act by President George W. Bush. This law is designed to hold schools accountable for the performance of students who are struggling to learn. It is a reauthorization of the Elementary and Secondary Education Act of 1965 (Education.com, n.d.).

Norming group: A large sample (ideally one that is representative of a well-defined population) whose scores on a test provide a set of standards against which the scores of subsequent individuals who take the test can be referenced (Gall, Gall, & Borg, 2007).

Norm-referenced assessments: An approach to testing in which an individual’s score on a test is interpreted by comparing it to the scores earned by norming a group (Gall, Gall, & Borg, 2007).

Platooning: Also known as departmentalization, platooning is divvying up instruction according to subject area, with students rotating to different teachers for different subjects (Hood, 2009).

Proficiency: The National Assessment Governing Board has established a general definition of proficiency: “Students reaching this level have demonstrated competency over challenging subject matter, including subject-matter knowledge, application of such knowledge to real world situations, and analytical skills appropriate to the subject matter (Fuller, Wright, Gesicki, & Kang, 2007).
**Scaled Scores**: Conversion of a student’s raw score on a test or version of a test to a common scale allowing for numerical comparison between students. Scale scores are useful for comparing test scores over time (Education.com, n.d.).

**Title I**: Title I of the Elementary and Secondary Education Act, as amended (ESEA) provides financial assistance to local educational agencies (LEAs) and schools with high numbers or high percentages of children from low-income families to help ensure that all children meet challenging state academic standards. Federal funds are currently allocated through four statutory formulas that are based primarily on census poverty estimates and the cost of education in each state (USDOE, 2014).

**Quality of Distribution Index (QDI)**: Measures the distribution of student performance on state assessments around the cut points for basic, proficient, and advanced performance. The formula for the QDI is $(%\text{Basic}) + (2 \times %\text{Proficient}) + (3 \times %\text{Advanced})$ (MDE, 2012).

**Quasi-experiment**: Experimental situations in which the researcher assigns, but not randomly, participants to groups because the experimenter cannot artificially create groups for the experiment (Creswell, 2012).
CHAPTER TWO

Review of the Literature

This chapter presents a review of literature related to student achievement in departmentalized and self-contained elementary school structures. In the era of accountability and high stakes testing, school leaders are challenged to meet the growing demands for increased levels of academic achievement for all students (Brinkman & Twiford, 2012).

This literature review presents the following information: the history of school organizational structures, public school accountability, and previous research related to departmentalized and self-contained education structures.

History of School Organizational Structures

The idea of education in America dates back to the colonial era. Reviewing the historical context of education is important for providing a glimpse into how education began and how far the system has advanced. Education in the American colonies began as a religious endeavor (Brackemyre, 2012). The English Puritans who settled Boston in 1630 believed that children's welfare, on earth and in the afterlife, depended in large part on their ability to read and understand the Bible. They also believed the success of the colony rested on citizens being able to read and understand the laws governing them. These beliefs led to the establishment of schools (Mass Moments, 2005).

The nation’s oldest public school, the Boston Latin School, opened in 1635. Soon after, Charlestown, Salem, and Dorchester followed. These grammar schools were paid for with public funds, and aimed to educate boys preparing to enter the ministry (Mass Moments, 2005).
The responsibility for teaching all other children to read and write was left to parents or masters. In order to enforce this rule, in 1642 Puritan leaders passed the Massachusetts Bay Law of School. This law required parents and masters to teach dependents to read and write. Later, the Puritan community questioned the effectiveness of this law and passed the Old Deluder Act of 1647 (Brackemyre, 2012). This Massachusetts law was the first to require towns to provide schools, shifting the responsibility for educating children from home to the town. From this law, all towns with fifty or more families were required to employ a schoolmaster to teach children reading, writing, and arithmetic in common schools. Towns with one hundred or more families were required to hire a schoolmaster to teach children reading, writing, arithmetic, and Latin in grammar schools. In reality, many Massachusetts towns failed to establish such schools. The schools which were established concentrated on producing an elite class of educated future business and political leaders instead of the general public (Brackemyre, 2012).

The years following America’s independence from Britain did little to change the American public education system (Brackemyre, 2012). In 1789 Massachusetts was the first state in the American nation to pass a comprehensive education law. This legislation required all teachers in grammar schools to provide proof they received a formal education in a college or university and, equally important, were of good moral character. Even women who taught neighborhood dame schools were to be certified by the selectmen (Mass Moments, 2005).

**Thomas Jefferson’s Plan for Education.** Thomas Jefferson, elected governor of Virginia in 1779, was an early advocate for a public education system in America. According to Tozer, Senese, and Violas (2009), in the Bill for the More General Diffusion of Knowledge, Jefferson proposed four stages in his plan for Virginia’s education structure: elementary schools, grammar schools, the university, and lifelong learning. Jefferson believed education was
necessary because voting citizens need to understand issues and be able to make informed
decisions (Brackemeyer, 2012). He also believed happiness was perceived through knowledge
(Tozer et al., 2009). Jefferson’s plan was defeated in Congress multiple times.

**The Common School Era.** Elementary schooling was accessible for most children in
Massachusetts by the 1830s. The schools were locally controlled and attendance was voluntary.
The schools were normally poorly constructed rooms with poor lighting and primitive furniture.
One teacher typically instructed a large number of students ranging in age from two to twenty-
five (Tozer et al., 2009).

One of America’s most influential education activists was Horace Mann, a Massachusetts
native. While serving as senator, Mann successfully lobbied for Massachusetts to create a state
board of education and resigned from his senate seat in order to become Secretary of the
Massachusetts State Board of Education (Brackemeyer, 2012). While secretary, Mann focused
on multiple education issues such as school buildings, moral values, discipline, teachers, and the
economic value of education (Tozer et al., 2009).

In the 1840s, Mann traveled to Europe to view the Prussian system of education. He was
greatly influenced by their idea of the common school movement. Based on ideas from the
Prussian system, Mann worked to create a standardized, compulsory education system with
professionally trained teachers for all Massachusetts children (Brackemeyer, 2012).

Based on the Prussian system, Mann also introduced the system of separating students
into groups based on age and ability. The system was a success as it allowed students to learn
with children their own age (Brackemeyer, 2012).

The concept of a public system of education began to spread to other states in America.
Some states expressed concern over state systems of education, believing education should
remain a local decision (Tozer et al., 2009). However, a new democratic system, increased immigration, advancements in industrialization, and stronger urbanization led favoring free education at public expense (Bowersock, 1970).

**Types of Schools.** By the 1830s, subjects normally taught in early schools included reading, spelling, writing, arithmetic, geography, manners and morals, and history. Sewing was part of the curriculum for girls. One of the earliest of these schools was the dame school. Dame schools were often found in households or empty buildings and held a few weeks at a time when convenient for all involved. There were generally not more than thirty students at a time, with boys ranging in age from four to seven and girls ranging from four and up (Bowersock, 1970).

Another type of school was the primary school. It was similar to the dame schools except they were divided into four classes. In the highest class were the students who read in the Testament. The second highest class consisted of students capable of easy reading. In order to be eligible for the third group, students must be capable of spelling with at least two syllables. Students in the lowest group received instruction in letters and monosyllables (Bowersock, 1970).

Near the end of the eighteenth century, the departmental school became prominent, especially in New England states. According to Bowerstock, to be admitted to the departmental school, students must have received instruction in a dame or primary school. In the departmental school, courses were divided into separate departments and students received instruction in each course from a different teacher in a different room.

Another early school structure was a graded school known as the Quincy Grammar School. The original structure of this school was a four-story building with twelve classrooms. For each classroom, there was one teacher and individual seats for up to fifty-five students. The
curriculum was divided into six different levels and each level was for a specific grade. Students were to complete the work for the specific grade within a school year or be retained in the grade for another school year (Bowersock, 1970).

Public School Accountability

In 1994, during the Clinton presidential administration, Congress passed Goals 2000: The Educate America Act. According to the New York State Education Department (2006), Goals 2000 was a federal grant program supporting state development of standards and assessments and school district implementation of standards-based reform (Goals 200: Educate America Act).

In October 1994, Clinton signed into law the reauthorization of ESEA, naming it the Improving America’s Schools Act (IASA). Under IASA, states receiving federal funds were required to have standards and assessments in place by the 2000-2001 school year. The USDOE provided a flexibility waiver for Mississippi and a number of other states allowing more time for meeting standards and assessment requirements (Improving America’s School Act of 1994; Hull, 2002). Mississippi’s deadline for compliance was June 2003. According to the MDE Office of Research and Statistics (2010), the first live administration of the Mississippi Curriculum Test (MCT) and the new Subject Area Tests in Algebra I, Biology I, English II, and U.S. History occurred during the 2000-2001 school year.

On January 8, 2002, President George W. Bush signed into law the No Child Left Behind Act (NCLB) of 2001 (No Child Left Behind Act of 2001). This education legislation set the standards for assessing public schools’ success in maximizing student achievement. Lamb (2007) explains NCLB is built on four common-sense pillars: accountability for results, an emphasis on doing what works based on scientific research, expanded parental options, and expanded local control and flexibility. An element of the accountability for results component
requires all public school teachers be highly qualified. Highly qualified indicates the teacher has a college degree, possesses full state certification, and has passed subject-specific tests to ensure competency. According to Rose (2004), NCLB requires public school districts and schools demonstrate adequate yearly progress (AYP) toward a particular goal: universal student attainment of academic achievement standards established by each state. All students, regardless of their ethnicity, socioeconomic status, need for exceptional education services, native language, or other limitations, must meet AYP (Brinkman & Twiford, 2012). Rose (2004) emphasizes public schools not meeting AYP for two consecutive years could suffer loss of federal funding, termination of staff, and dissolution of school districts.

**Mississippi Performance Based Accountability System.** The issue of education has historically been challenging for Mississippi. A number of changes occurred from early 1900s to 1970 in the Mississippi Accrediting System. According to MDE (2012), the Accreditation Law of 1970 gave the State Board of Education power to set standards and procedures and placed responsibility on the MDE to enforce standards and procedures. During the late seventies and early eighties, focus of accreditation standards began shifting from quantity-based measures such as adequate personnel and resources to the quality of the education students receive.

In 1982, Mississippi Governor William Winter signed into law the Education Reform Act. According to MDE (2012), this landmark legislation proposed a plan to establish guidelines and criteria for a performance based school accreditation system for all public elementary and high schools. The Commission on School Accreditation was formed to create performance-based standards for measuring student mastery of defined content and objectives. The law required more focus be placed on student achievement outcomes and changed the accreditation process from voluntary to mandatory. The first assessments based on these standards were
administered in 1987.

This accountability system, the Mississippi Performance-Based Accountability System, was the first for Mississippi and one of the first in the country. Mississippi’s first accountability system was used from 1988 to 1994 (Mississippi Department of Education Office of Research and Statistics, 2010). Mississippi revised the Mississippi Performance-Based Accountability System in 1994 to include more rigorous curriculum guidelines and assessments. The revised accountability model classified districts according to five accreditation levels one through five. School districts were assigned a performance index from 1.0 to 5.0 (Mississippi Department of Education Office of Research and Statistics, 2010). According to the MDE (2012), the Mississippi Student Achievement Act of 1999 was passed requiring the State Board of Education to create a school evaluation and improvement system. This new accreditation system set standards for both individual schools and school districts (Mississippi Student Achievement Improvement Act of 1999). Annual performance standards were created which measured a school’s performance against itself using student performance and growth measures. Legislation in 2000 emphasized making accreditation levels reflective of student performance at the school level. The accreditation level was determined based on annual growth expectations and the percentage of students scoring basic and proficient.

In 2007, the Accountability Task Force, established by MDE, began developing a new accountability system. The fourth accountability system consists of three components: achievement, growth, and high school completion (Thompson, 2011). This system required revisions of the state language and mathematics curriculum frameworks. These frameworks were implemented in 2007, and new state assessments were developed. The assessments were the Mississippi Curriculum Test, Second Edition (MCT2) for grades three through eight and the
Algebra I, English II, Biology, and U.S. History subject area tests (SATP2) for high school students. These assessments were designed to meet NCLB testing requirements. MCT2 assessments provide a numeric scale score and proficiency level for each student in language arts and mathematics.

For the achievement component of the model, student proficiency levels are compiled to calculate the Quality of Distribution Index (QDI). According to Thompson (2011), the QDI formula is the (\% Basic) + (2 \times \% Proficient) + (3 \times \% Advanced). The QDI is reported for schools and districts. QDI values range from zero to 300.

According to MDE (2010), the growth component of the Mississippi accountability model measures the degree to which a school or district met expected performance expectations during the previous school year. Thompson (2011) explains Growth residuals of zero or positive residuals indicate schools and/or districts “Met” expectations. If public schools and/or districts fail to meet growth goals they are labeled “Did not meet growth.”

Based on results from the Achievement Model and Growth Model, schools are assigned a School Performance Classification (SPC). Schools with a grade 9-12 configuration also include the High School Completion Index (HSCI) in the SPC (MDE, 2012). According to MDE (2012), districts are assigned an Annual Performance Classification (APC) based on achievement, growth, and graduation/dropout rate. The classifications include Star School/Star District, High Performing School/District, Successful School/District, Academic Watch School/District, At Risk of Failing School/District, Low Performing School/District, or Failing School/District. These classifications were renamed in 2011 to A School/District, B School/District, C School/District, D School/District, and F School/District.
Previous Research on Departmentalized and Self-Contained Structures

Elementary schools are structured as self-contained or departmentalized. Welbourn (2005) defines the self-contained classroom as one in which the same group of students receive instruction from the same teacher for core subjects such as language arts, mathematics, social studies, and science. Elaborating on the self-contained setting, Welbourn contends the only classes students typically have different teachers for are special subjects such as physical education, music, or art.

Rogers (2012) defines a departmentalized classroom as one in which students have various teachers for separate subject areas. Students may have a different teacher for each subject or separate teachers responsible for multiple subjects. In Mississippi, teachers must be highly qualified, meaning a licensed endorsement, in subject areas in order to meet NCLB requirements. Teachers certified in kindergarten through sixth grade are considered qualified to teach all core subjects. In order to be considered highly qualified in special subjects or core subjects in grades seven through twelve, teachers must have a licensed endorsement in the subject the teaching assignment. Numerous studies have been conducted in order to determine which practice in elementary education is better: departmentalization or self-contained. While results vary as to which structure is better, researchers have found advantages and disadvantages of both practices. Moore (2008) contends understanding how children learn and the impact of learning environments, including qualified teachers, may be factors in obtaining AYP and improving student achievement.

Advantages of Departmentalization. According to Dropsey (2004), the underlying reason for departmentalization in many schools is the demand to meet standards, indicators, and benchmarks of the state curriculum. While experimentation with departmentalization in
elementary grades has occurred over the past century, departmentalization grew in popularity after the 2001 NCLB Act increased pressure on schools to raise test scores (Gewertz, 2014). Anderson argues (as cited by Findley, 1966), the major advantage of the departmentalized school is teachers’ ability to provide instruction in the subject they have the greatest understanding. Although this is an advantage of departmentalization, teachers are not always assigned to subjects based on their competency in the subject. Teachers are often assigned a course because they have an endorsement in the subject, even if they are not competent or comfortable with the content of the subject.

Research has indicated elementary school subjects require much more rigid, specialized training than many people believe (Liu, 2011). Departmentalization allows targeted professional development, allowing teachers to become experts in the field they are teaching. Increasing teacher capacity and pedagogy will assist in providing meaningful instruction for increasing student achievement (Chan & Jarman, 2004; Hood, 2009; Bingham, 2011).

In addition to increased pedagogy, teacher effectiveness increases when the teacher is providing instruction in the subject they enjoy (Chan & Jarman, 2004). Teachers’ interest and understanding of a subject drives them to delve deeper into the curriculum and maximize resources and preparation time in order for students to meet the standards set forth in state curriculums (Chan & Jarman, 2004; Dropsey, 2004; Liu, 2011). There have been numerous studies conducted citing departmentalization as a positive structure for teacher morale (Strohl, 2014).

In an elementary school in Lincoln, Nebraska administrators made the decision to departmentalize the Unit Studies curriculum (Science, Social Studies, and Health) in an effort to reduce the preparation load for fifth grade teachers. Subjects were divided into ninety-minute
blocks amongst three fifth grade teachers. The blocks were mathematics and social studies; reading and health; and writing and science. Andrews, one of the fifth grade teachers in the school, conducted an action research project seeking to discover if student performance in mathematics improved by departmentalizing the fifth grade curriculum (Andrews, 2006). During the study, Andrews was seeking to evaluate teacher perceptions of departmentalization.

According to Andrews (2006), student performance in mathematics was measured comparing current fifth grade student scores on Metropolitan Achievement Test (MAT) to fifth grade MAT scores from the previous year’s fifth grade students. Teacher perceptions were gauged using a survey administered at onset of the first year of departmentalization and again at the end of the experimental year. With data collected from pre and post surveys, Andrews (2006) was comparing differences in teacher perceptions regarding stress levels, quality of lesson planning, and ability to assess student work regarding self-contained structure and departmentalized structure.

According to Andrews (2006), when analyzing test scores she found class composite scores for Total Math and all Math subtests were generally maintained. Upon closer inspection of the data rankings in terms of national data, Andrews discovered fourteen percent of previous year fifth graders ranked in the bottom quartile and only nine percent of current year students fell into the bottom quartile. She notes the top two quartiles were maintained from previous year’s scores.

Comparison results from pre and post surveys for teacher perceptions reveal teachers favored the departmentalized structure, noting they enjoyed planning for fewer subjects because they had more time for locating resources necessary for creating meaningful lessons. Teachers reported feeling less overwhelmed with the amount of work and being stronger teachers in the
subjects they were required to teach. Teachers also reported enjoying developing relationships with all fifth grade students instead of those only assigned to their homeroom (Andrews, 2006).

Strohl (2014) conducted a case study comparing levels of perceived stress and morale in relation to job satisfaction between the departmentalized teachers and self-contained teachers within the same rural Title I elementary Georgia school. Administrators in the school asked twelve of the twenty-nine first through third grade teachers to implement departmentalization for one school year. Four teachers from each grade, first through third, participated in the departmentalized experiment. The remaining seventeen teachers remained in the self-contained structure (Strohl, 2014).

Data for the study was collected from a survey completed by all twenty-nine teachers before and after the experimental year of departmentalized instruction. According to Strohl, this survey provided information allowing the researcher to compare departmentalization’s impact on certain aspects of teacher morale and perceptions of work environment. Other data included information collected from focus groups and individual interviews with the twelve departmentalized teachers.

Strohl’s findings revealed departmentalized teachers experienced higher morale, lighter workload, and increased overall job satisfaction in comparison to self-contained teachers in the same school. In comparison to their prior self-contained learning experiences, departmentalized teachers preferred the new structure. Post-survey findings also indicate remaining self-contained teachers expressed interest in participating in the departmentalized structure.

Strohl contends because of additional pressure being placed on educational systems, teacher workload continually increases, and administrators should make an effort to alleviate as much teacher stress as possible in attempt to decrease burnout and job dissatisfaction. Findings
in Strohl’s study report departmentalized teachers reported increased morale, as they felt more confident in their abilities because they were able to complete tasks with more focus on fewer subjects. Strohl also pointed out relieving teachers’ stress improved their personal health, well-being, and family relationships, leading to an increase in job satisfaction as they were not attributing the negative effects of stress to their job and work environment.

Researchers have also noted in a self-contained setting, non-tested core subjects such as social studies and science are often given minimal attention, but the departmentalized setting schedules dedicated time for each subject, making time management more efficient. (Dropsey, 2004; Liu, 2011).

The advantages discussed thus far focus more on benefits for teachers because these benefits have a direct impact on quality of instruction and student achievement. According to Hood (2009), an advantage of departmentalization for students is it breaks the monotony of students spending all day with the same teacher in the same classroom. Students are provided an opportunity to be challenged by different teachers and different classroom environments. Students are able to move more frequently during the day which helps increase attention (Dropsey, 2004).

Chan and Jarman (2004) argue departmentalization in elementary schools aligns with middle school organization, better preparing students for transition. Departmentalization affords students the opportunity to develop survival skills as they transition from the egocentrism of childhood to a group-centered way of life (Perlstein, 2003).

According to Chan, Terry, and Bessette (2009), findings from a number of studies suggest student achievement losses frequently result when transitioning from self-contained to a departmentalized structure. The authors explain elementary schools are typically organized into
self-contained classrooms while intermediate and middle schools are largely departmentalized, and the difference in structure often lead to obstacles in learning during the transitional period. The most significant obstacles seem social in nature as research indicates transition from self-contained to departmentalized structure negatively affects students’ self-concept of ability and value in academic disciplines. Research suggests there is need for concern in meeting pre-adolescents’ psychological needs such as the need to feel secure, accepted, safe, connected, and validated. Many educators and parents are opposed to departmentalization in elementary schools because they see the advantage of keeping the classrooms self-contained to maintain the uniqueness of a home-like environment and the teacher’s parental image (Chan et al., 2009).

Chan et al. (2009) recognize the concerns associated with departmentalization at the elementary level. They agree the self-contained classroom structure is good for transitioning students from home to school, but the authors contend departmentalization should not be categorically rejected for fourth and fifth grade students. Departmentalization in fourth and fifth grades, according to Chan et al. (2009), offers academic specialization in which self-contained classrooms are deficient. The authors contend departmentalization takes full advantage of the best teacher resources and facilitates instructional planning. They argue elementary students need to be exposed to the opportunity to develop survival skills as they transition from the egocentrism of childhood to a group-centered way of school life.

In the report, Daniel Terry, one of the authors, explains departmentalized fourth and fifth grade students in his elementary school adapted better to the departmentalized setting than peers attending fourth and fifth grade self-contained classrooms. Results were based upon faculty reports and scores from state competency tests (Chan et al., 2009). Significance levels of this
study were not reported, but the authors recommend educators contest the traditional self-contained structure of elementary schools in an effort to negate transitional challenges and give students more chance of success in middle school and beyond.

**Advantages of Self-Contained Structure.** The self-contained structure has a number of advantages leading it to be the chosen setting for many years (Ediger, 2002). Chan et al. (2009) contend the self-contained classroom structure is good for transitioning students from home to school. Many educators and parents are opposed to departmentalization in elementary schools because they see the advantage of keeping the classrooms self-contained to maintain the uniqueness of a home-like environment and the teacher’s parental image (Chan et al., 2009).

In the self-contained configuration, there is time for a relationship to form between the teacher and the student. Some research suggests the self-contained structure allows teachers to get to know students in terms of past achievement as well as developmentally. With this knowledge, teachers can customize lessons according to student needs (Ediger, 2002; Welbourn, 2005; Moore, 2008; Liu, 2011).

Chang (2008) conducted a study examining the relationship between different levels of departmentalization and students’ connectedness to school in eight elementary schools. Chang contends the connectedness students feel with school directly relates to academic success, and self-contained structures allow teachers more time to interact and learn the needs of students. The author explains students who feel closer to their teachers have fewer behavior problems and higher academic gains as compared to students feeling conflict with teachers.

Chang’s study was a causal comparative research design. Departmentalized students were matched with non-departmentalized students from eight elementary schools in the Jefferson County Public School district in Louisville, Kentucky. A power analysis determined at least 394
participants were needed but the study included 702 departmentalized students and 1100 non-departmentalized students. Data was collected in the form of student surveys and three sets of analyses were conducted (Chang, 2008). Chang describes the first set of data measured differences in student survey results between departmentalized and non-departmentalized students. Findings revealed significant differences (4.43, p < .001) in departmentalized students and non-departmentalized students. These results were divided into two subscales: classroom supportiveness and trust/respect for teacher. According to Chang, non-departmentalized students rated both categories significantly higher than departmentalized students.

The second analyses examined the degree of departmentalization, specifically, how many teachers were included in the departmentalized instructional team. Chang found significant differences in self-contained students, students with two teachers, and students who had three or more teachers. Further analysis determined the major differences resulted from students with three or more teachers. According to Chang, there were no significant differences between students with two teachers and self-contained students on the surveys.

The final set of data measured the previous analyses by grade level (3rd, 4th, and 5th) investigating whether departmentalization relates to students’ connectedness to school depending on their grade level (Chang, 2008). A MANCOVA analysis was conducted and results indicate age significantly affects departmentalization interaction (3.35, p < .001) with younger students relating lower ratings of classroom supportiveness and trust/respect for teachers (Chang, 2008).

The implications of Chang’s study are important when determining the most effective elementary school structure because if school connectedness has a direct impact on student achievement, as this study suggests, departmentalization could hinder positive student achievement. Chang (2008) also discusses past research findings suggesting positive
relationships between teachers and students are vital for economically disadvantaged students. The reason for this, she suggested, is because many of these students come from single parent homes with fewer positive role models, leading school adults a primary source of adult interactions. Forming positive adult relationships often becomes a motivation for student achievement (Chang, 2008).

Lobdell and Van Ness (1963) contend content integration is more efficient in self-contained classroom settings. According to the authors, reinforcement of learning often occurs when concepts are applied to areas outside the subject in which they are initially taught. The authors argue this type of reinforcement, mutual enrichment, and integrative process is difficult and likely ineffective outside the self-contained setting.

**Previous Studies Related to Student Achievement.** Multiple studies have been conducted in an attempt to determine the better organizational structure for educating elementary students.

In a Chicago public school in 1996, Harris conducted a study testing the effect of departmentalization on the reading achievement of sixth grade students in a Chicago public school. According to Harris (1996), the population of the area is mostly lower socioeconomic, with a large number of single parent families, many of which are on government assistance. A random sample of thirty students was selected as the experimental group from a total of fifty-three sixth grade students receiving instruction in a departmentalized setting. A second random sample of thirty students was selected as the control group from a total of fifty-four students receiving instruction in a self-contained setting (Harris, 1996). Reading achievement was measured using fifth grade results from the Iowa Test of Basic Skills as the pretest and sixth grade results from the Iowa Tests of Basic Skills as the posttest. Pretest scores indicated no
significant difference in reading achievement of the two groups when the study began. T-tests were conducted for pre and post test comparisons of student results on the Iowa Test of Basic Skills. Findings revealed a significant difference in the effect of organizational structure on reading achievement. The results of this study indicate self-contained classroom instruction is more successful for reading achievement of sixth grade students than departmentalized instruction. According to Harris, most students in the experimental group only showed a few months of progress. However, some students within the experimental group excelled, gaining two to two and a half years growth. Others in the group remained the same level, and three students regressed by two or three months. Students in the control group showed a higher and more consistent growth pattern with no student regressions. Harris explains the results of this study differ from results of previous literature and assumes results were a result of the transitional year from self-contained to departmentalized instruction.

Lamme (1976) conducted a three-year longitudinal study in a village elementary school in Central New York in order to determine which educational structure, self-contained or departmentalized, had more influence on the reading habits of elementary students. The study began with ninety fourth grade students who moved from self-contained fourth grade classes to departmentalized fifth grade classes and then forward to sixth grade departmentalized classes. Students were asked to complete reading records for each book they read. These records were collected every two weeks to measure student reading habits.

Lamme notes differences within teachers in the self-contained environment from the study. He found one teacher (Class 3) strongly encouraged reading by providing time during the day for reading and book discussions leading these students to read three times as many books as students in Class 2. Another teacher did not allow children to read or discuss books throughout
the day so they reported reading far fewer books than students in other classes. Two other fourth
grade classes fell somewhere between these two classes (Lamme, 1976). The mean for books
read during students’ fourth grade year was 22 books. Students entered into a departmentalized
structure for fifth grade and the mean number of books read fell slightly to 20.1. The mean
number of books read was reported at 20.6 during the sixth grade school year (Lamme, 1976).

Findings reveal departmentalized classroom environments had less influence on the
amount of reading done than self-contained classrooms. The results of Lamme’s study, while
not at a significant level, suggested self-contained organization structure offered more influence
on the amount of student reading than departmentalization. Lamme suggested this was because
students were in each class for a shorter period of time, and teachers in a self-contained setting
had more opportunity to exert their influences on the reading habits of students.

In another study in an elementary school in Lincoln Nebraska, administrators made the
decision to departmentalize the Unit Studies curriculum (science, social studies, and health) in an
effort to reduce the preparation load for fifth grade teachers. Subjects were divided into ninety-
minute blocks amongst three fifth grade teachers. The blocks were mathematics and social
studies; reading and health; and writing and science. Andrews, one of the fifth grade teachers in
the school, conducted an action research project seeking to discover if student performance in
mathematics improved by departmentalizing the fifth grade curriculum (Andrews, 2006). The
author was also seeking to determine teacher perceptions of the newly departmentalized classes.

Andrews explains student performance in mathematics was measured comparing current
fifth grade student scores on Metropolitan Achievement Test (MAT) to fifth grade MAT scores
from the previous year’s fifth grade students. Teacher perceptions were gauged using a survey
administered at onset of the first year of departmentalization and again at the end of the
experimental year. With data collected from pre and post surveys, Andrews (2006) was comparing differences in teacher perceptions regarding stress levels, quality of lesson planning, and ability to assess student work regarding self-contained structure and departmentalized structure.

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Comparison results from pre and post surveys for teacher perceptions reveal teachers favored the departmentalized structure, noting they enjoyed planning for fewer subjects because they had more time for locating resources necessary for creating meaningful lessons. Teachers reported feeling less overwhelmed with the amount of work and being stronger teachers in the subjects they were required to teach. Teachers also reported enjoying developing relationships with all fifth grade students instead of those only assigned to their homeroom (Andrews, 2006).

Taylor-Buckner (2014) conducted a quantitative study examining the effects of elementary departmentalization on student math proficiency. According to Taylor-Buckner, this was done by exploring and comparing the background and educational characteristics, teaching practices, assessment methods, beliefs, and influence of departmentalized elementary mathematics teachers. She explained the study also sought the circumstances for significant differences in mathematics proficiency between departmentalized and non-departmentalized elementary students, and examined whether or not these differences continued into students’ eighth grade years. The study also investigated if there was a relationship between elementary
departmentalization and mathematics proficiency and to identify additional factors possibly leading to mathematics proficiency (Taylor-Buckner, 2014).

Data for Taylor-Buckner’s study was collected from the U.S. Department of Education’s Early Childhood Longitudinal Study, Kindergarten Class of 1998-1999 data set. This data set is a national data set following the same students from kindergarten to eighth grade (Taylor-Buckner, 2014).

According to Taylor-Buckner, when comparing all third grade students there is not a significant difference in mathematical proficiency between self-contained and departmentalized students; however, a significant difference in mathematical proficiency was determined between third grade self contained and departmentalized students of teachers with below-average mathematics backgrounds. Third grade students receiving instruction from departmentalized mathematics teachers with below-average mathematics backgrounds improved substantially more than students of mathematically below-average teachers in a self-contained setting. Taylor-Buckner also points out when the third graders reached fifth grade, the significant difference of the departmentalized group gained more in mathematics proficiency than the self-contained group. Results for fifth grade students were found to be very similar to third grade results.

McGrath and Rust (2002) conducted a study examining the relationship between classroom organizational structure and standardized achievement scores, transition times between classes, and instruction time. The population included 103 fifth grade students and 94 sixth grade students from two kindergarten through sixth grade schools in rural Tennessee. The authors explain there were 109 students in school A and 88 students in school B. All students from both schools attended self-contained fourth grade classes. School A transitioned to
departmentalization for fifth and sixth grades and school B remained self-contained through the sixth grade. Student achievement was measured using the Tennessee Comprehensive Assessment Program (TCAP) and transition time was recording by students being directly observed for two full inconsecutive days (McGrath & Rust, 2002). The results of this study indicated students in self-contained classrooms outperformed in the areas of Total Battery, Language, and Science. The results revealed no significant difference between the groups in reading, mathematics, or social studies. According to McGrath and Rust, transition time was significantly more effective in the self-contained classroom structure (average 3.27 minutes) than the departmentalized structure (average 4.55 minutes); however, the authors contend there was no significant difference in actual instructional time.

Moore (2008) conducted a study seeking to identify associations between classroom organizational structures and student achievement scores. The population consisted of fourth and fifth grade classes in six East Tennessee school systems. Student TCAP scores were used for determining student achievement in language arts, mathematics, science, and social studies. According to Moore, descriptive and inferential analysis was used. The author explained findings reveal no significant difference in student TCAP scores for fourth and fifth grade students in language arts, science, and social studies when comparing students in departmentalized and self-contained structures; however, fifth grade students had significant differences in achievement mathematics scores between those students in self-contained and departmentalized classrooms, slightly favoring departmentalized classrooms.

Gewertz (2014) explains during the 2009-2010 school year the Palm Beach County, Florida school system required departmentalization in all 109 elementary schools for grades three through five. According to the Palm Beach County School District's website, the
percentage of all grade 3-5 students scoring at or above achievement level in reading on the 2010 Florida Comprehensive Assessment Test (FCAT) was 71%, as compared to 72% in 2009. For mathematics, the percentage of all grade 3-5 students scoring at or above achievement level on the FCAT was 72% for 2009 and 2010.

Conclusion

From the historical overview included in the chapter, it is evident education has been an important concept in America since colonial times. Although the methods for teaching children has evolved and subjects being taught in schools have become more complex over the years, the number one goal of education is still to teach students responsible citizenship and provide them with skills needed to lead a productive life.

The question of whether departmentalized or self-contained classroom structures are more effective for student achievement has been a question for many years. The articles cited in the chapter discuss advantages and disadvantages for both structures, and discuss findings from previous research.
CHAPTER THREE

Methodology

Introduction

Chapter three provides a description of the population, sample, assessment instrument, and data analysis. In this study, the researcher sought to answer the following question: Is there a statistically significant difference when comparing student performance in self-contained classroom structures to students in departmentalized classroom structures in Mississippi schools measured by the aggregated differences in percentage of MCT2 performance levels in grades four, five, and six between SY 2009-2010 and 2010-2011, between SY 2010-2011 and 2011-2012, and between 2011-2012 and 2012-2013?

The independent variable is classroom structure, divided into two levels: self-contained and departmentalized. Grades four, five, and six were included in this study because each grade is assessed using the MCT2 and all three grades are considered elementary according to MDE licensure. Although third grade meets the same criteria, this grade was excluded from the study because this is the initial grade level for students to begin sitting for the MCT2. The dependent variables are the aggregated differences in percentage of MCT2 performance level in grades four, five, and six between school years (SY) 2009-2010 and 2010-2011, between SY 2010-2011 and 2011-2012, and between 2011-2012 and 2012-2013.

Self-contained classrooms are identified as classrooms wherein one teacher is responsible for teaching all core subjects (reading, language arts, mathematics, science, social studies) to a group of students. In a departmentalized setting, the core subjects (reading, mathematics,
language arts, science, and social studies) are typically taught by different teachers. Departmentalization may consist of a different teacher for each subject, or students transitioning to different teachers who provide instruction in multiple subjects (Rogers, 2012).

**Design**

In order to answer the research question of this quasi-experimental study, the researcher received approval of the dissertation committee. After the dissertation committee approved the study, the researcher requested approval from The University of Mississippi’s Internal Review Board (IRB). The IRB deemed the study exempt from the need for IRB approval. The researcher collected historical MCT2 assessment data for school years 2009-2010, 2010-2011, 2011-2012, and 2012-2013 from the MDE website. This data served as the foundation for comparative purposes between classroom structure types.

After historical MCT2 data was collected for each year of the study was collected, the researcher organized data within an Excel spreadsheet and determined the initial target population was 574 Mississippi schools serving grades four, five, and/or six. From this collection of data, the researcher was able to eliminate schools with missing MCT2 data and schools assigned a new school code by the MDE. When analysis was complete, 72 schools had been eliminated from the initial population, leaving a target population of 502 Mississippi schools.

Using MCT2 data, the researcher calculated performance differences between MCT2 performance levels for each school year included in the study. A research purpose value was generated for SY 2009-2010 based on the percent minimal value, percent basic value, percent proficient value, and the percent advanced value, resulting in a value termed the Quality of Distribution Index-Revised (QDI-R). This developmental value was calculated for each school
during each of the school years in the study and the aggregate difference, whether positive or negative, between school years serve as the value utilized for comparison in the study.

MDE assigns points for MCT2 performance levels in order to calculate Quality of Distribution Index (QDI). Points within the QDI formula are assigned to performance levels as follows: Advanced performance earns three points, Proficient performance earns two points, basic performance scores one point, and students scoring minimal earn no points toward the QDI value of the school. For the purpose of this study, the researcher altered the values assigned to the various performance levels as four (advanced), three (proficient), two (basic), one (minimal), respectively. The purpose of this revision is to include those students scoring minimal, to provide a voice and to assess their impact on the study. The updated QDI-R formula serves to measure an increase or decrease in student achievement. The modified QDI-R was calculated for fourth, fifth, and sixth grades for each school year included in the study. After calculating the QDI-R, the differences were calculated for QDI-R values between SY 2009-2010 and SY 2010-2011, and the difference in QDI-R values between SY 2010-2011 and SY 2011-2012, and the difference between QDI-R values for SY 2011-2012 and SY 2012-2013.

In determining classification as departmentalized or self-contained organizational structure, the researcher sent email requests for information to principals of the remaining 502 Mississippi public schools serving fourth, fifth, and/or sixth grade classes. A second email was sent to principals failing to respond to the first request for information. Follow up phone calls were conducted for schools failing to respond to the email requests. From the 502 schools, only 84 schools responded to the email requests for information. The remaining 418 schools were contacted by phone. Some provided information over the phone, while others requested the email questionnaire be faxed to them for completion. Overall, 134 (27%) of the 502 schools
failed to provide structural information by email, phone, or fax. This is a 73% overall response rate, totaling 368 schools, from the population.

As responses to the classification requests were collected, the researcher categorized each school included in the study as a departmentalized or a self-contained classroom structure. After computing the difference in performance value, differences in QDI-R for each fourth, fifth, and sixth grade in each of the 368 Mississippi public schools between each school year of the study, three values were aggregated illustrating the variance from one school year to another. Both positive and negative differences were included in the study.

**Population and Participants**

The initial population of the study was 574 Mississippi schools serving grades four, five, and/or six. After removing the 72 schools with missing MCT2 data or new MDE school codes, the remaining population was 502 schools. There was a 73 percent response rate on the request for information, leaving 134 schools failing to respond. The collective population for grades four, five, and six was 368 schools.

Because analysis was being conducted on each grade level individually, the population was disaggregated to determine total N counts for fourth, fifth, and sixth grades. When examining the data for fourth grade, of the 368 schools responding to the survey, there were 86 schools reporting they do not serve fourth grade and 35 fourth grade schools reported a change in structure. Therefore, there were 247 Mississippi schools serving fourth grade included in the population. For fifth grade, of the 368 schools, 96 reported not serving fifth grade and 30 schools changed structures. This left a total of 242 Mississippi schools serving fifth grade included in the population. When examining the sixth grade population data, of the 368 schools, 132 reported not serving sixth grade and 29 of the schools changed structures. A total of 207
Mississippi schools serving sixth grade was included in the population.

**Hypotheses**

The primary research hypotheses are:

- **H₀₁**: There is no significant difference in fourth grade student performance in language arts when comparing students in self-contained classroom structures to students in departmentalized structures.

- **H₀₂**: There is no significant difference in fourth grade student performance in mathematics when comparing students in self-contained classroom structures to students in departmentalized structures.

- **H₀₃**: There is no significant difference in fifth grade student performance in language arts when comparing students in self-contained classroom structures to students in departmentalized structures.

- **H₀₄**: There is no significant difference in fifth grade student performance in mathematics when comparing students in self-contained classroom structures against students in departmentalized structures.

- **H₀₅**: There is no significant difference in sixth grade student performance in language arts when comparing students in self-contained classroom structures against students in departmentalized structures.

- **H₀₆**: There is no significant difference in sixth grade student performance in mathematics when comparing students in self-contained classroom structures against students in departmentalized structures.

**Instruments**

MCT2 assessment data was gathered from the Reports section of the MDE website. This
information is readily available so requests for this data are not necessary. The first instrument used in the study is an Excel spreadsheet listing each Mississippi school serving fourth, fifth, and/or sixth grade and calculations of positive or negative differences in performance levels and difference in QDI-R between school years for each school year included in the study. The second instrument was an email request for information to principals of the 502 Mississippi public schools for determining departmentalized or self-contained organizational structure of the fourth, fifth, and sixth grade classes (see Appendix A).

**Statistical Tests and Data Analysis**

In this study, the researcher sought to answer the following question: Is there a difference when comparing student performance in self-contained classroom structures to students in departmentalized classroom structures in Mississippi schools measured by the aggregated differences in percentage of MCT2 performance levels in grades four, five, and six between SY 2009-2010 and 2010-2011, between SY 2010-2011 and 2011-2012, and between 2011-2012 and 2012-2013?

In order to answer this question, SPSS, version 22 was utilized to conduct a one-way Multivariate Analysis of Variance (MANOVA). The MANOVA was chosen as the appropriate test because the researcher wanted to describe the effect of the independent variable (class structure) on the combined dependent variables (three QDI-R differences). While it would be acceptable to run multiple one-way ANOVAS, this analysis would not determine the correlation between the dependent variables. If correlation was too high, the researcher would need to reject the multivariate outcome and this cannot be done with multiple one-way ANOVAS (pearsonhighered.com, n.d.).
CHAPTER FOUR

Results

Introduction

The purpose of this quasi-experimental, quantitative study was to determine whether there was a statistically significant difference in the student achievement of Mississippi students in grades four, five, and six in the subjects of language arts and mathematics based on departmentalized and self-contained classroom structures. The measure utilized for the study was differences between MCT2 QDI-R values for the school years 2009-2010 and 2010-2011; 2010-2011 and 2011-2012; 2011-2012 and 2012-2013.

The population of the study included all Mississippi schools serving grades four, five, and six meeting the following criteria: schools were not missing any MCT2 data from any of the school years included in the study; schools responded to a questionnaire or follow-up phone calls or; classroom structure for grade level did not change during school years included in the study; and schools had no changes in configurations leading to a new Mississippi school code. MDE assigns a code to each school and district in the state. When districts add schools, the new school receives a new MDE school code.

The initial N count of schools serving grades four, five, and/or six was 574. The number was reduced to 502 when schools with missing MCT2 scores or new school codes were discovered in the data. There were 134 schools failing to respond to the request for structural information. When analyzed individually, the N counts for fourth, fifth, and sixth grades were 247, 242, and 207, respectively.
Assumptions testing and a one-way MANOVA were conducted for each of the three grade levels included in the study. The following research question guided this study: Is there a difference when comparing student performance in self-contained classroom structures to students in departmentalized classroom structures in Mississippi schools measured by the aggregated differences in percentage of MCT2 performance levels in grades four, five, and six between SY 2009-2010 and 2010-2011, between SY 2010-2011 and 2011-2012, and between 2011-2012 and 2012-2013?

Although some schools included in the population contain data for multiple grades, data for each grade level were analyzed and reported separately.

**Fourth Grade Analysis**

A total of 247 Mississippi schools serving fourth grade met the criteria for being included in the study. Classroom structures were broken into two categories: departmentalized and self-contained. There were 176 (71%) Mississippi schools structured as departmentalized for fourth grade and 71 (29%) Mississippi schools structured as self-contained for fourth grade.

**Hypotheses.** Along with the aforementioned research question, the research hypotheses for the fourth grade population are as follows:

\( H_{01}: \) There is no significant difference in fourth grade student performance in language arts when comparing students in self-contained classroom structures to students in departmentalized structures.

\( H_{02}: \) There is no significant difference in fourth grade student performance in mathematics when comparing students in self-contained classroom structures to students in departmentalized structures.
**Assumptions Testing.** An assumption is an assertion presumed to be true but not actually verified (Yearwood, 2011). According to Lund and Lund (2013), seven assumptions need to be satisfied for valid one-way MANOVA results. The assumptions are: independence of observations, adequate sample size, lack of univariate or multivariate outliers, multivariate normality, lack of multicollinearity, linearity, and homogeneity of variance-covariance. Each assumption was tested prior to conducting the one-way MANOVA. The verifications and violations for each assumption are reported.

**Independence of observations.** The measure for determining a significant difference between class structures is the difference in QDI-R calculations over the four years of data included in the study. This resulted in three data points for language and three data points for mathematics. The first observation was the difference in SY 2009-2010 and SY 2010-2011 QDI-R values. The second observation was the difference in SY 2010-2011 and SY 2011-2012 QDI-R values. The last observation was the difference in SY 2011-2012 and SY 2012-2013. Although the QDI-R values overlap, the observations are independent of each other because none of the differences have any influence on the other two data points.

**Adequate sample size.** Although larger sample sizes are better for MANOVA, in order to meet the assumption of adequate sample size there needs to be more cases in each group than the number of dependent variables being analyzed (Lund & Lund, 2013). The current study has three dependent variables (QDI-R differences) for each subject. Therefore, the study meets the assumption because the departmentalized group contains 176 participants and the self-contained group contains 71 participants.

**Lack of univariate outliers.** According to Gall, Gall, and Borg (2007), an outlier is a member of the population whose score differs markedly from the scores obtained by other
members of the sample. Using SPSS, version 22, each dependent variable was assessed for univariate outliers by inspection of boxplots. Hinkle, Wiersma, and Jurs (2003) explain boxplots are a graphical summary illustrating both the central tendency and the dispersion of scores.

Univariate outliers were found for each structure of each dependent variable. Findings of boxplot analyses are summarized in Table 1. The dependent variables are named as follows: grade level (G4), the last two digits of the two school years from which the QDI-R difference was calculated (1011), and subject. Language arts is identified as LANG. An example of the variable name will appear as follows G41011LANG. Because it may appear the outliers were removed in an effort to influence results, the decision was made to keep the outliers as part of the study.

Table 1

<table>
<thead>
<tr>
<th>DV</th>
<th>Departmentalized univariate outliers</th>
<th>Box-lengths beyond edge of box</th>
<th>Self-contained univariate outliers</th>
<th>Box-lengths beyond edge of box</th>
</tr>
</thead>
<tbody>
<tr>
<td>G41011LANG</td>
<td>5</td>
<td>1.5</td>
<td>2</td>
<td>1.5</td>
</tr>
<tr>
<td>G41112LANG</td>
<td>4</td>
<td>1.5</td>
<td>1</td>
<td>1.5</td>
</tr>
<tr>
<td>G41213LANG</td>
<td>4</td>
<td>1.5</td>
<td>4</td>
<td>1.5</td>
</tr>
<tr>
<td>G41011MATH</td>
<td>5</td>
<td>1.5</td>
<td>4</td>
<td>1.5</td>
</tr>
<tr>
<td>G41112MATH</td>
<td>2</td>
<td>1.5</td>
<td>1</td>
<td>1.5</td>
</tr>
<tr>
<td>G41213MATH</td>
<td>8</td>
<td>1.5</td>
<td>5</td>
<td>1.5</td>
</tr>
</tbody>
</table>

In SPSS, version 22, a distance of 1.5 box-lengths beyond the edge of the box is notated by a circular dot and an asterisk notates a distance of three box-lengths beyond the edge of the box (see Appendix B).
**Normality.** In order to determine normal distribution for each dependent variable and classroom structure, the SPSS Shapiro-Wilk Tests of Normality output was analyzed. Should the significance level for any of the rows of the Shapiro-Wilk Test of Normality be less than .05 (p < .05), the assumption of normality has been violated. As notated in Table 2, five of the twelve rows (42%) of the dependent variables violated the assumption of normality because the significance level was less than .05. Although these violations occurred, the analysis of the data continued because the one-way MANOVA is fairly robust to violations from normality (Lund & Lund, 2013).

Table 2

*Shapiro-Wilk Grade 4 Violations of Normality*

<table>
<thead>
<tr>
<th>Dependent Variable</th>
<th>Classroom Structure</th>
<th>Shapiro-Wilk</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Statistic</td>
</tr>
<tr>
<td>G41011LANG</td>
<td>Departmentalized</td>
<td>.976</td>
</tr>
<tr>
<td>G41112LANG</td>
<td>Self-contained</td>
<td>.952</td>
</tr>
<tr>
<td>G41213LANG</td>
<td>Departmentalized</td>
<td>.980</td>
</tr>
<tr>
<td>G41213LANG</td>
<td>Self-contained</td>
<td>.950</td>
</tr>
<tr>
<td>G41011MATH</td>
<td>Departmentalized</td>
<td>.979</td>
</tr>
</tbody>
</table>

**Multicollinearity.** According to Lund and Lund (2013), in using a MANOVA, dependent variables need to be moderately correlated with each other. The authors contend correlations of 0.9 or greater are problematic for MANOVA and recommend removing the extremely correlated dependent variable(s) because this decreases statistical efficiency. Using
SPSS, version 22, a Pearson ($r$) correlation test was conducted and found no correlations of 0.9 or greater; therefore, multicollinearity is not a problem for this data set.

**Linearity.** In MANOVA, there needs to be a linear relationship between each pair of dependent variables for each independent variable. If variables are not linearly related, the power of the test is reduced (Lund & Lund, 2013). Linearity is tested in SPSS by plotting a scatterplot matrix for each group of the independent variable. A line of best fit can be included in the scatterplot matrix for demonstrating the linear relationship. A line rising from the left to right reveals a positive relationship. A line falling from left to right indicates a negative relationship. Flatter lines, either positive or negative, reveal a weaker linear relationship between the variables. The scatterplot matrix for grade 4 language arts (see Appendix D) revealed a linear relationship between each pair of dependent variables for the departmentalized population. For the self-contained population, the line of best fit demonstrated a weak linear relationship between each of the pairs of variables.

When examining the line of best fit in the scatter plot matrix for grade 4 mathematics (see Appendix E), a linear relationship was found between each pair of the variables in the departmentalized structure with the exception of G41011MATH and G41213MATH. The line of best fit for this pair of variables was seemingly flat, indicating a lack of linear relationship. When the scatterplot for the self-contained structure was examined, a linear relationship was found to exist between each pair of the variables.

**Lack of multivariate outliers.** After assuming linearity, a regression procedure called Mahalanobis Distance was conducted in SPSS in order to determine the presence of multivariate outliers. Multivariate outliers differ from univariate outliers because they are data points with an unusual combination of values on the dependent variable (Lund & Lund, 2013). A Mahalanobis
Distance was conducted for language arts and mathematics. Results of this test were revealed by new variables being created in a table labeled MAH within SPSS with values assigned to each population participant. In order to determine multivariate outliers, the critical value had to be determined by the number of dependent variables. This study has three independent variables, making the critical value 16.27. Any number in the MAH column greater than 16.27 is a multivariate outlier.

Results of the Mahalanobis Distance test for grade four language arts identified four of the 247 schools as multivariate outliers with MAH values of 19.52, 17.84, 17.35, and 16.91 (see Appendix F). When examining the Mahalanobis Distance test for grade four mathematics, two of the 247 schools were multivariate outliers with MAH values of 20.05261 and 17.36721. Although multivariate outliers violate the MANOVA assumption, the test is adequately robust to continue with the test without removing the outliers from the data (Lund & Lund, 2013).

**MANOVA Results.** The final assumption examined is homogeneity of variance-covariance, and the statistical test for this assumption derives from the MANOVA test. The MANOVA procedure was conducted and reportedly separately for language arts and mathematics.

**Descriptive statistics.** Presented in Table 3 are the means and standard deviations for each language arts dependent variable. In Table 4, the means and standard deviations for each mathematics dependent variable are illustrated.

**Language arts.** As stated in Table 3, for the G41011LANG dependent variable, there was a difference in means of 4.69 between the departmentalized and self-contained classroom structures, favoring the self-contained structure. The G41112LANG dependent variable revealed only a very slight difference in means of 0.8 between the departmentalized and self-contained
classroom structures, yet the slight difference favored self-contained. The G41213LANG showed a difference in means of 2.2 between the departmentalized and self-contained classroom structures, favoring the departmentalized structure. While reviewing the means of the departmentalized structure for each dependent variable, results indicated no pattern between variables. There was an increase from -1.19 (G41011LANG) to 8.24 (G41112LANG), and then a decrease to 6.4 (G41213LANG). There was also no pattern for the means of the self-contained structure for each dependent variable. There was an increase from 3.5 (G41011LANG) to 9.04 (G41112LANG), and then a decrease to 4.2 (G41213LANG).

Table 3

*Descriptive statistics for grade 4 language arts*

<table>
<thead>
<tr>
<th>DV</th>
<th>Class Structure</th>
<th>N</th>
<th>Mean</th>
<th>SD</th>
<th>Min</th>
<th>Max</th>
<th>Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>G41011LANG</td>
<td>Departmentalized</td>
<td>176</td>
<td>-1.19</td>
<td>23.58</td>
<td>-94</td>
<td>61.3</td>
<td>155.3</td>
</tr>
<tr>
<td></td>
<td>Self-contained</td>
<td>71</td>
<td>3.5</td>
<td>23</td>
<td>-79.7</td>
<td>44.2</td>
<td>123.9</td>
</tr>
<tr>
<td></td>
<td>Difference in Means</td>
<td></td>
<td>4.69</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>G41112LANG</td>
<td>Departmentalized</td>
<td>176</td>
<td>8.24</td>
<td>24.78</td>
<td>-86.9</td>
<td>71.8</td>
<td>158.7</td>
</tr>
<tr>
<td></td>
<td>Self-contained</td>
<td>71</td>
<td>9.04</td>
<td>21.82</td>
<td>-34.2</td>
<td>72.5</td>
<td>106.7</td>
</tr>
<tr>
<td></td>
<td>Difference in Means</td>
<td></td>
<td>0.8</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>G41213LANG</td>
<td>Departmentalized</td>
<td>176</td>
<td>6.4</td>
<td>23.91</td>
<td>-70.4</td>
<td>59.5</td>
<td>129.9</td>
</tr>
<tr>
<td></td>
<td>Self-contained</td>
<td>71</td>
<td>4.2</td>
<td>21.33</td>
<td>-38.6</td>
<td>58.6</td>
<td>97.2</td>
</tr>
<tr>
<td></td>
<td>Difference in Means</td>
<td></td>
<td>2.2</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Mathematics. As illustrated in Table 4, the mean differences between the departmentalized and self-contained classroom structures for each dependent variable was calculated and reported. For G41011MATH, the difference in means for the departmentalized and self-contained classroom structures was 1.71, supporting the self-contained structure. When exploring the G41112MATH difference in means for the two structures, the difference of 1.85 was found, favoring the departmentalized structure. When comparing the difference in means for G41213MATH, the difference was 2.14, favoring the self-contained structure. When comparing the means for the dependent variables of the departmentalized structure, there was an increase from .447 (G41011MATH) to 11.83 (G41112MATH), and then a decrease to 9.44 (G41213MATH). Based on these results, there is no pattern between variables. For the self-contained structure, the mean increased from 2.16 (G41011MATH) to 9.98 (G41112MATH) and increased again to 11.58 (G41213MATH). This indicates a pattern of steady increase over the years of study.
Table 4

*Descriptive statistics for grade 4 mathematics*

<table>
<thead>
<tr>
<th>DV</th>
<th>Class Structure</th>
<th>N</th>
<th>Mean</th>
<th>SD</th>
<th>Min.</th>
<th>Max.</th>
<th>Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>G41011MATH</td>
<td>Departmentalized</td>
<td>176</td>
<td>.447</td>
<td>25.4</td>
<td>-70.6</td>
<td>87.5</td>
<td>158.1</td>
</tr>
<tr>
<td></td>
<td>Self-contained</td>
<td>71</td>
<td>2.16</td>
<td>23</td>
<td>-73</td>
<td>63.3</td>
<td>136.3</td>
</tr>
<tr>
<td>Difference in Means</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>G41112MATH</td>
<td>Departmentalized</td>
<td>176</td>
<td>11.83</td>
<td>26</td>
<td>-69.1</td>
<td>80.2</td>
<td>149.3</td>
</tr>
<tr>
<td></td>
<td>Self-contained</td>
<td>71</td>
<td>9.98</td>
<td>21.04</td>
<td>-25.7</td>
<td>72.8</td>
<td>98.5</td>
</tr>
<tr>
<td>Difference in Means</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>G41213MATH</td>
<td>Departmentalized</td>
<td>176</td>
<td>9.44</td>
<td>23.05</td>
<td>-69</td>
<td>80</td>
<td>149</td>
</tr>
<tr>
<td></td>
<td>Self-contained</td>
<td>71</td>
<td>11.58</td>
<td>20.49</td>
<td>-32.7</td>
<td>63.2</td>
<td>95.9</td>
</tr>
<tr>
<td>Difference in Means</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Homogeneity of Variance-Covariance Assumption.** In order to determine whether variables are similar across groups, the Box’s M Test of Equality of Covariance Matrices were analyzed for language arts and for mathematics. According to Lund and Lund (2013), if the significance level of the Box’s M test is less than .001 (p < .001) the test is statistically significant and the assumption of homogeneity of variance-covariance has been violated. The Box’s M results for grade four language arts and mathematics were .742 and .194, respectively. Based on the findings, (p > .001) in both subjects, the test was not statistically significant for either subject and the assumption of homogeneity of variance-covariance was met.
**Significance between groups.** According to Lund and Lund (2013), the main result from the one-way MANOVA test is contained in the Multivariate Test Table. Four multivariate statistical values are given for the researcher to determine the one most appropriate for analysis of the data set. According to pearsonhighered.com (n.d.), Hotelling’s Trace can be used when there are only two groups but this test is not as powerful as Pillai’s Trace. The source explains Pillai’s Trace can be used with any number of groups but this test is less viable when sample sizes within the groups are unequal. Wilk’s Lamda is commonly used when the independent variable has more than two groups, therefore Wilk’s Lamda is not used.

For the sake of this study, because there are two groups within the independent variable and the sample sizes are unequal, Hotelling’s Trace was chosen as the statistical test for determining if a significant difference exists between departmentalized and self-contained groups. If the significance level is less than .05 (p < .05), there is a statistically significant difference between structures based on combined dependent variables.

**Language arts.** Based on the results from the MANOVA, there is no statistically significant difference between departmentalized and self-contained classroom structures on mean differences of language arts QDI-R values, F(3, 242) = 1.208 (p = .307). The significance of .307 (p > .05) prevents rejection of the null hypothesis: there is no significant difference in fourth grade student performance in language arts when comparing students in self-contained classroom structures to students in departmentalized structures.

**Mathematics.** Based on the results from the MANOVA, there is no statistically significant difference between departmentalized and self-contained classroom structures on mean differences of mathematics QDI-R values, F(3, 243) = .246, (p = .864). The significance of .864 (p > .05) prevents rejection of the null hypothesis: there is no significant difference in fourth
grade student performance in mathematics when comparing students in self-contained classroom structures to students in departmentalized structures.

**Fifth Grade Analysis**

A total of 242 Mississippi schools serving fifth grade met the criteria for being included in the study. There were 213 (88%) Mississippi schools structured as departmentalized for fifth grade and 29 (12%) Mississippi schools structured as self-contained for fifth grade.

**Hypotheses.** Along with the aforementioned research question, the research hypotheses for the fifth grade population are as follows:

- $H_{o3}$: There is no significant difference in fifth grade student performance in language arts when comparing students in self-contained classroom structures to students in departmentalized structures.
- $H_{o4}$: There is no significant difference in fifth grade student performance in mathematics when comparing students in self-contained classroom structures against students in departmentalized structures.

**Assumptions Testing.** Testing for the seven MANOVA assumptions for fifth grade was conducted in the same matter as for fourth grade. The verifications and violations for each assumption are reported.

- **Independence of observations.** As with fourth grade, the measure for determining a significant difference between structures is the difference in QDI-R calculations over the four years of data included in the study. This resulted in three data points for language arts and three data points for mathematics. The observations for fifth grade are independent of each other because none of the QDI-R differences have any influence on the other two data points.

- **Adequate sample size.** As stated previously, for MANOVA, the sample size requires
more cases in each group than the number of dependent variables being analyzed. Although the groups are extremely unbalanced, with 213 schools for the departmentalized structure and 29 schools for the self-contained structure, the assumption is met.

**Lack of univariate outliers.** Using SPSS, version 22, each dependent variable was assessed for univariate outliers by inspection of boxplots (See Appendix G). As presented in Table 5, univariate outliers were found in each dependent variable for the departmentalized structure. When examining the boxplots of the self-contained structures, univariate outliers were found for each language arts dependent variable. There was an extreme outlier for the two variables, G51112LANG and G51213LANG. Only one univariate outlier was found for the mathematics self-contained variables, G51112MATH. Because it may appear the outliers were removed in an attempt to influence results, the decision was made to keep the outliers as part of the study.

Table 5

*Summary of Grade 5 Univariate Outliers Determined by Boxplot Analysis*

<table>
<thead>
<tr>
<th>DV</th>
<th>Departmentalized univariate outliers</th>
<th>Box-lengths beyond edge of box</th>
<th>Self-contained univariate outliers</th>
<th>Box-lengths beyond edge of box</th>
</tr>
</thead>
<tbody>
<tr>
<td>G51011LANG</td>
<td>3</td>
<td>1.5</td>
<td>2</td>
<td>1.5</td>
</tr>
<tr>
<td>G51112LANG</td>
<td>5</td>
<td>1.5</td>
<td>1</td>
<td>3</td>
</tr>
<tr>
<td>G51213LANG</td>
<td>4</td>
<td>1.5</td>
<td>1</td>
<td>3</td>
</tr>
<tr>
<td>G51011MATH</td>
<td>4</td>
<td>1.5</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>G51112MATH</td>
<td>7</td>
<td>1.5</td>
<td>1</td>
<td>1.5</td>
</tr>
<tr>
<td>G51213MATH</td>
<td>2</td>
<td>1.5</td>
<td>0</td>
<td></td>
</tr>
</tbody>
</table>

*Normality.* In order to determine normal distribution for each dependent variable and
classroom structure, the SPSS Shapioro-Wilk Tests of Normality output was inspected for significance levels less than .05. Findings (p < .05) indicate the assumption of normality has been violated. As reported in Table 6, three of the twelve (25%) of the dependent variables violated the assumption of normality because the significance level was less than .05. Although these violations occurred, the analysis of the data continued because the one-way MANOVA is fairly robust to violations of normality (Lund & Lund, 2013).

Table 6

<table>
<thead>
<tr>
<th>Dependent Variable</th>
<th>Classroom Structure</th>
<th>Shapiro-Wilk</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Statistic</td>
</tr>
<tr>
<td>G51112LANG</td>
<td>Self-contained</td>
<td>.913</td>
</tr>
<tr>
<td>G51213LANG</td>
<td>Self-contained</td>
<td>.857</td>
</tr>
<tr>
<td>G51112MATH</td>
<td>Departmentalized</td>
<td>.987</td>
</tr>
</tbody>
</table>

**Multicollinearity.** In order to determine the presence of multicollinearity, Pearson (r) correlations were examined for each pair of grade five dependent variables for language arts and mathematics. There were no correlations of 0.9 or greater; therefore, multicollinearity is not present in this data set (See Appendix H).

**Linearity.** In order to determine presence of a linear relationship, scatterplot matrices for each group of the dependent variables for each structure were created using SPSS. A total of four matrices were created, one for each structure and subject. When examining the scatterplot matrices for language arts (See Appendix I), there was a linear relationship present between each pair of departmentalized dependent variables. There were negative linear relationships between
G51011LANG, G51112LANG, as well as G51112LANG, G51213LANG. There was a weak positive linear relationship for the pair G51011LANG, G51213LANG. The matrix for the self-contained language arts revealed negative linear relationships between the pairs G51011LANG, G51112LANG and G51112LANG, G51213LANG. A positive linear relationship was found for G51011LANG, G51213LANG.

When examining the scatterplot matrices for mathematics (See Appendix J), a linear relationship was found to exist between each pair of departmentalized dependent variables. There was a negative linear relationship between the following pairs: G51011MATH, G51112MATH, and G51112MATH, G51213MATH. A weak positive relationship existed between G51011MATH, G51213MATH. When analyzing the self-contained mathematics matrices, negative linear relationships were found for the following pairs of dependent variables: G51011MATH, G51112MATH, and G51112MATH, G51213MATH. A positive linear relationship was found between G51011MATH, G51213MATH.

**Lack of multivariate outliers.** After assuming linearity, a test of Mahalanobis Distance was conducted for language arts and mathematics dependent variables in order to determine presence or absence of multivariate outliers. When examining the results of the grade five MAH for language arts and mathematics, no values were greater than the critical value 16.27; therefore, no outliers were present in the grade five data.

**MANOVA Results.** As with fourth grade, the final assumption tested is homogeneity of variance-covariance, and statistical testing for this assumption derives from the MANOVA test. The MANOVA procedure was conducted and reported separately for language arts and mathematics.

**Descriptive statistics.** Presented in Table 7 are the means and standard deviations for
each language arts dependent variable. In Table 8, the means and standard deviations for each mathematics dependent variable are illustrated.

*Language arts.* As illustrated in Table 7, for the G51011LANG dependent variable, there was a difference in means of -1.91, favoring departmentalization. There was a difference in means of 8.22 for G51112LANG, distinctly favoring the self-contained structure. The difference in means for G51213LANG was 3.4, supporting the self-contained structure. When studying the means of each language arts dependent variable, both were negative for the G51011LANG variable, followed by an increase for G51112LANG. The increase for self-contained was notable with the mean rising from 2.05 to 14.16. The third variable, G51213LANG decreased from the second measure in both structures.
Table 7

Descriptive statistics for grade 5 language arts

<table>
<thead>
<tr>
<th>DV</th>
<th>Class Structure</th>
<th>N</th>
<th>Mean</th>
<th>SD</th>
<th>Min.</th>
<th>Max.</th>
<th>Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>G51011LANG</td>
<td>Departmentalized</td>
<td>213</td>
<td>-.14</td>
<td>19.73</td>
<td>-60</td>
<td>65.6</td>
<td>125.6</td>
</tr>
<tr>
<td></td>
<td>Self-contained</td>
<td>29</td>
<td>-2.05</td>
<td>22.46</td>
<td>-46.8</td>
<td>52.4</td>
<td>99.2</td>
</tr>
<tr>
<td>Difference in Mean</td>
<td></td>
<td></td>
<td>-1.91</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>G51112LANG</td>
<td>Departmentalized</td>
<td>213</td>
<td>5.94</td>
<td>21.41</td>
<td>-54.4</td>
<td>67.6</td>
<td>122</td>
</tr>
<tr>
<td></td>
<td>Self-contained</td>
<td>29</td>
<td>14.16</td>
<td>29.72</td>
<td>-40.5</td>
<td>114.3</td>
<td>154.8</td>
</tr>
<tr>
<td>Difference in Mean</td>
<td></td>
<td></td>
<td>8.22</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>G51213LANG</td>
<td>Departmentalized</td>
<td>213</td>
<td>3.82</td>
<td>20.92</td>
<td>-64.6</td>
<td>61.6</td>
<td>126.2</td>
</tr>
<tr>
<td></td>
<td>Self-contained</td>
<td>29</td>
<td>7.22</td>
<td>33.81</td>
<td>-119.2</td>
<td>71.3</td>
<td>190.5</td>
</tr>
<tr>
<td>Difference in Mean</td>
<td></td>
<td></td>
<td>3.4</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Mathematics.** The difference in means for departmentalized and self-contained structures for each mathematics dependent variable was calculated and reported (See Table 8). For G51011MATH, the difference in means was 1.74, slightly favoring departmentalization. When examining G51112MATH, the difference in means was found to be 7.07, considerably favoring the self-contained structure. The third variable revealed a difference in means of 6.54, favoring the self-contained structure. Based on the results of the descriptive statistics, although the mean for the G51011MATH was low, the mean for the self-contained structure had a notably higher mean than departmentalization in the remaining two variables.
Table 8

*Descriptive statistics for grade 5 mathematics*

<table>
<thead>
<tr>
<th>DV</th>
<th>Class Structure</th>
<th>N</th>
<th>Mean</th>
<th>SD</th>
<th>Min.</th>
<th>Max.</th>
<th>Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>G51011MATH</td>
<td>Departmentalized</td>
<td>213</td>
<td>1.33</td>
<td>25.94</td>
<td>-68.4</td>
<td>78.4</td>
<td>146.8</td>
</tr>
<tr>
<td></td>
<td>Self-contained</td>
<td>29</td>
<td>-.41</td>
<td>28.29</td>
<td>-52.2</td>
<td>51.7</td>
<td>103.9</td>
</tr>
<tr>
<td>Difference in Mean</td>
<td></td>
<td></td>
<td>1.74</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>G51112MATH</td>
<td>Departmentalized</td>
<td>213</td>
<td>4.66</td>
<td>24.94</td>
<td>-78.5</td>
<td>83.4</td>
<td>161.9</td>
</tr>
<tr>
<td></td>
<td>Self-contained</td>
<td>29</td>
<td>11.73</td>
<td>25.43</td>
<td>-59.1</td>
<td>57.7</td>
<td>116.8</td>
</tr>
<tr>
<td>Difference in Mean</td>
<td></td>
<td></td>
<td>7.07</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>G51213MATH</td>
<td>Departmentalized</td>
<td>213</td>
<td>3.57</td>
<td>23.7</td>
<td>-72.2</td>
<td>63.7</td>
<td>135.9</td>
</tr>
<tr>
<td></td>
<td>Self-contained</td>
<td>29</td>
<td>10.11</td>
<td>28.49</td>
<td>-41.2</td>
<td>70.9</td>
<td>112.1</td>
</tr>
<tr>
<td>Difference in Mean</td>
<td></td>
<td></td>
<td>6.54</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Homogeneity of Variance-Covariance Assumption.** In order to determine similarity of variables across groups, the Box’s M Test of Equality of Covariance Matrices was analyzed for language arts and mathematics. The Box’s M result for language arts was .007 (p > .001), and the Box’s M result for mathematics was .121 (p > .001). Because the significance level for both subjects was greater than .001, the assumption of homogeneity of variance-covariance was met.

**Significance between groups.** As with fourth grade, Hotelling’s Trace was chosen as the statistical test for determining if a significant difference exists between departmentalized and self-contained fifth grade classroom structures. When analyzing the Multivariate Test Table, if the significance is less than .05 (p < .05), there is a statistically significant difference between structures based on combined dependent variables.
Language arts. Based on the results from the MANOVA, there is no statistically significant difference between departmentalized and self-contained classroom structures on mean differences of language arts QDI-R values, F(3, 238) = 2.558 (p = .056). The significance of .056 (p > .05) prevents rejection of the null hypothesis: there is no significant difference in fifth grade student performance in language arts when comparing students in self-contained classroom structures to students in departmentalized structures.

Mathematics. Results of the MANOVA revealed no statistically significant difference between departmentalized and self-contained classroom structures on mean differences of mathematics QDI-R values, F(3, 238) = 2.194 (p = .089). The significance of .089 (p > .05) prevents rejection of the null hypothesis: there is no significant difference in fifth grade student performance in mathematics when comparing students in self-contained classroom structures to students in departmentalized classroom structures.

Sixth Grade Analysis

A total of 207 Mississippi schools serving sixth grade met the criteria for being included in the study. There were 196 (95%) Mississippi schools structured as departmentalized for sixth grade instruction and 11 (5%) Mississippi schools structured as self-contained for sixth grade.

Hypotheses. Along with the previously stated research question, the research hypotheses for the sixth grade population are as follows:

H_{05}: There is no significant difference in sixth grade student performance in language arts when comparing students in self-contained classroom structures against students in departmentalized structures.
$H_{06}$: There is no significant difference in sixth grade student performance in mathematics when comparing students in self-contained classroom structures against students in departmentalized structures.

**Assumptions Testing.** As with fourth and fifth grade analyses, the seven assumptions of the one-way MANOVA were tested. The confirmations and violations for each assumption are reported.

**Independence of observation.** The measure for determining if a significant difference between class structures is the difference in QDI-R calculations over the four years of data included in the study. The observations are independent of each other because none of the differences have any influence on the other two data points.

**Adequate sample size.** In order to meet the assumption of adequate sample size, there must be more cases in each group than the number of independent variables being analyzed. Because we have 196 departmentalized sixth grade schools and 11 self-contained, the assumption is met. However, the population between the groups is highly unbalanced and this was reported as a limitation of the study.

**Lack of univariate outliers.** Boxplots were created and analyzed for identifying the presence or absence of univariate outliers (See Appendix K). A summary of univariate outliers is presented in Table 9. Univariate outliers were present in each dependent variable for the departmentalized structure. When analyzing the self-contained structure, univariate outliers were found for G61011LANG, G61011MATH, and G61112MATH. In order to prevent the appearance of attempting to influence results, the univariate outliers were not removed from the study.
Table 9

Summary of Grade 6 Univariate Outliers Determined by Boxplot Analysis

<table>
<thead>
<tr>
<th>DV</th>
<th>Departmentalized univariate outliers</th>
<th>Box-lengths beyond edge of box</th>
<th>Self-contained univariate outliers</th>
<th>Box-lengths beyond edge of box</th>
</tr>
</thead>
<tbody>
<tr>
<td>G61011LANG</td>
<td>10</td>
<td>1.5</td>
<td>1</td>
<td>1.5</td>
</tr>
<tr>
<td>G61112LANG</td>
<td>7</td>
<td>1.5</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>G61213LANG</td>
<td>9</td>
<td>1.5</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>G61011MATH</td>
<td>4</td>
<td>1.5</td>
<td>1</td>
<td>1.5</td>
</tr>
<tr>
<td>G61112MATH</td>
<td>6</td>
<td>1.5</td>
<td>1</td>
<td>1.5</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>G61213MATH</td>
<td>2</td>
<td>1.5</td>
<td>0</td>
<td></td>
</tr>
</tbody>
</table>

**Normality.** Normal distribution for each dependent variable and classroom structure was determined by analyzing the SPSS Shapiro-Wilk Tests of Normality (See Table 10). Based on the results, four of the twelve rows (33%) violated the normality assumption (p < .05). As previously mentioned, though the violations of the assumption of normality occurred, analysis continued because the one-way MANOVA is rather robust to violations from normality (Lund & Lund, 2013).
Table 10

*Shapiro-Wilk Grade 4 Violations of Normality*

<table>
<thead>
<tr>
<th>Dependent Variable</th>
<th>Classroom Structure</th>
<th>Shapiro-Wilk Statistic</th>
<th>df</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>G61011LANG</td>
<td>Departmentalized</td>
<td>.975</td>
<td>196</td>
<td>.001</td>
</tr>
<tr>
<td>G61112LANG</td>
<td>Departmentalized</td>
<td>.977</td>
<td>196</td>
<td>.002</td>
</tr>
<tr>
<td>G61112MATH</td>
<td>Departmentalized</td>
<td>.981</td>
<td>196</td>
<td>.011</td>
</tr>
<tr>
<td>G61112MATH</td>
<td>Self-contained</td>
<td>.713</td>
<td>11</td>
<td>.001</td>
</tr>
</tbody>
</table>

**Multicollinearity.** In order to test for the presence of multicollinearity, a Pearson ($r$) correlation test was conducted using SPSS. Results of the correlation test revealed there is no multicollinearity (greater than 0.9) for grade six dependent variables (See Appendix L).

**Linearity.** To test for linearity, a scatterplot matrix with a line of best fit was created in SPSS for each sixth grade language arts structure (See Appendix M) and another for each mathematics structure (See Appendix N). When examining the grade six language arts matrix for the departmentalized structure, a negative linear relationship exists between the following pairs of dependent variables: G61011LANG, G61112LANG and G61112LANG, G61213LANG. A lack of linear relationship existed between the pair G61011LANG, G61213LANG. Based on the matrix, for the language arts self-contained structure, there was a lack of linearity between each pair of dependent variables. For grade six departmentalized mathematics, there was a negative linear relationship between the following pairs: G61011MATH, G61112MATH and G61112MATH, G61213MATH. There appeared to be a lack of linearity between the pair G61011MATH, G61213MATH. In the mathematics self-contained matrix, there was a lack of
linearity between each pair of dependent variables. According to Lund and Lund (2013), a lack of linearity does not mean there is no relationship between the variables, and the researcher can accept a reduction in power and carry on with the MANOVA analysis.

**Lack of multivariate outliers.** As stated earlier, in order to determine multivariate outliers a Mahalanobis Distance test was conducted for language arts and mathematics (See Appendix O). Results of the Mahalanobis Distance test for language arts identified four of the 207 schools were multivariate outliers with MAH values of 20.23, 18.94, 18.40, and 18.18. The Mahalanobis Distance test for mathematics revealed a single multivariate outlier out of the 207 schools with a MAH value of 16.69. Because the MANOVA is robust to violations of the multivariate normality assumption, the test can continue without removing the outliers from the data (Lund & Lund, 2013).

**MANOVA Results.** As mentioned during fourth and fifth grade analysis, the final assumption tested is homogeneity of variance-covariance, and this assumption is determined after running the MANOVA statistical tests. The MANOVA procedure was conducted separately for language arts and mathematics, and results are reported in this manner.

**Descriptive statistics.** Illustrated in Table 11 are the means and standard deviations for each language arts dependent variable. In Table 12, the means and standard deviations for each mathematics dependent variable are presented.

**Language arts.** The difference in means between structures for G61011LANG was 9.18, markedly favoring the self-contained structure. However, there was a decrease in the self-contained mean for G61112LANG, dropping from 12.5 to -6. The difference in means between structures for the G61112LANG dependent variable was 10.87, favoring departmentalization. There was an increase in the self-contained structure for G61213LANG, increasing from -6 to -
3. There was a decrease in G61213LANG for departmentalization from 4.87 to .08. The difference in means between structures for G61213LANG was .038, slightly favoring departmentalization. Based on these results, there is no pattern of increase or decrease for either structure over the years of the study.

Table 11

Descriptive statistics for grade 6 language arts

<table>
<thead>
<tr>
<th>DV</th>
<th>Class Structure</th>
<th>N</th>
<th>Mean</th>
<th>SD</th>
<th>Min.</th>
<th>Max.</th>
<th>Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>G61011LANG Departmentalized</td>
<td>196</td>
<td>3.32</td>
<td>19</td>
<td>-68.4</td>
<td>60.6</td>
<td>129</td>
<td></td>
</tr>
<tr>
<td>Self-contained</td>
<td>11</td>
<td>12.5</td>
<td>19.94</td>
<td>-25</td>
<td>37.5</td>
<td>62.5</td>
<td></td>
</tr>
<tr>
<td>Difference in Mean</td>
<td>9.18</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>G61112LANG Departmentalized</td>
<td>196</td>
<td>4.87</td>
<td>19.69</td>
<td>-54.5</td>
<td>72.5</td>
<td>127</td>
<td></td>
</tr>
<tr>
<td>Self-contained</td>
<td>11</td>
<td>-6</td>
<td>19.80</td>
<td>-40.5</td>
<td>31</td>
<td>71.5</td>
<td></td>
</tr>
<tr>
<td>Difference in Mean</td>
<td>10.87</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>G61213LANG Departmentalized</td>
<td>196</td>
<td>.08</td>
<td>19.29</td>
<td>-70.5</td>
<td>50.8</td>
<td>121.3</td>
<td></td>
</tr>
<tr>
<td>Self-contained</td>
<td>11</td>
<td>-.3</td>
<td>17.98</td>
<td>-40</td>
<td>23.5</td>
<td>63.5</td>
<td></td>
</tr>
<tr>
<td>Difference in Mean</td>
<td>.38</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Mathematics. The difference in means between structures for G61011MATH was 13.47, considerably favoring the self-contained structure. However, there was a notable decrease in the mean for the self-contained structure for G61112MATH, dropping from 10.64 to -12.22. The difference in the mean for G61112MATH was 18.17, favoring the departmentalized structure. There was a noticeable increase in the mean of the self-contained structure for G61213MATH, increasing from -12.22 to 5.33. The difference in means between structures for G61213MATH
was 2.62, favoring departmentalization. Based on the results, there was an increase in mean of the departmentalized structure across the three variables, but there were no patterns of increase or decrease for the self-contained structure across the variables.

Table 12

*Descriptive statistics for grade 6 mathematics*

<table>
<thead>
<tr>
<th>DV</th>
<th>Class Structure</th>
<th>N</th>
<th>Mean</th>
<th>SD</th>
<th>Min.</th>
<th>Max.</th>
<th>Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>G61011MATH</td>
<td>Departmentalized</td>
<td>196</td>
<td>-2.83</td>
<td>22.6</td>
<td>-68.3</td>
<td>69.9</td>
<td>138.2</td>
</tr>
<tr>
<td></td>
<td>Self-contained</td>
<td>11</td>
<td>10.64</td>
<td>24.62</td>
<td>-20.7</td>
<td>70.8</td>
<td>91.5</td>
</tr>
<tr>
<td>Difference in Mean</td>
<td></td>
<td></td>
<td>13.47</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>G61112MATH</td>
<td>Departmentalized</td>
<td>196</td>
<td>5.95</td>
<td>23.23</td>
<td>-82.3</td>
<td>89.9</td>
<td>134.1</td>
</tr>
<tr>
<td></td>
<td>Self-contained</td>
<td>11</td>
<td>-12.22</td>
<td>31.21</td>
<td>74</td>
<td>19.7</td>
<td>93.7</td>
</tr>
<tr>
<td>Difference in Mean</td>
<td></td>
<td></td>
<td>18.17</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>G61213MATH</td>
<td>Departmentalized</td>
<td>196</td>
<td>7.95</td>
<td>22.59</td>
<td>-66.3</td>
<td>67.8</td>
<td>134.1</td>
</tr>
<tr>
<td></td>
<td>Self-contained</td>
<td>11</td>
<td>5.33</td>
<td>18.1</td>
<td>-29</td>
<td>30.4</td>
<td>59.4</td>
</tr>
<tr>
<td>Difference in Mean</td>
<td></td>
<td></td>
<td>2.62</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Homogeneity of Variance-Covariance Assumption.** The Box’s M test was conducted in SPSS for language arts and mathematics in an effort to determine if the homogeneity of variance-covariance assumption was met. The significance of Box’s M for language arts was .853 and the significance for mathematics was .676. In both subjects, (p > .001), therefore, the assumption was not violated.

**Significance between groups.** Because there are two groups within the independent variable and unequal sample sizes, Hotelling’s Trace was chosen as the statistical test for
determining if a significant difference exists between sixth grade departmentalized and self-contained groups. If significance is less than .05 (p < .05), there is a statistically significant difference between structures based on combined dependent variables.

*Language arts.* Based on results of the MANOVA, there is no statistically significant difference between departmentalized and self-contained structures on mean differences of language arts QDI-R values, F (3, 203) = 1.542 (p = .205). The significance of .205 (p > .05) prevents rejection of the null hypothesis: there is no significant difference in sixth grade student performance in language arts when comparing students in self-contained classroom structures to students in departmentalized structures.

*Mathematics.* Based on the results of the MANOVA, there is a statistically significant difference between departmentalized and self-contained structures on mean differences of mathematics QDI-R values, F (3, 203) = 2.868 (p = .038). The significance of .038 (p < .05) allows for rejection of the null hypothesis. Based on the results, there is a significant difference in sixth grade student performance in mathematics when comparing students in self-contained classroom structures to students in departmentalized structures.

In an effort to determine which dependent variable is contributing to the statistically significant results, the Tests of Between Subjects Effects was analyzed. Results indicated there was a statistically significant difference in classroom structures for G61112MATH, F (1, 205) = 6.128, (p = .014). Because the significance level is less than .05, the G61112MATH dependent variable is identified as the variable contributing to the difference between the two classroom structures.

**Summary of Findings**

In Table 13, a summary of the statistical findings has been provided. Based on the
findings, five of the six hypotheses were rejected because there was no statistically significant difference found between the two class structures. There was a statistically significant finding for grade six mathematics. Therefore, further analysis was conducted and identified G61112MATH as the variable contributing to the significant difference.

Table 13

*Summary of statistical findings from MANOVA*

<table>
<thead>
<tr>
<th>Hypothesis</th>
<th>p-value</th>
<th>Decision</th>
</tr>
</thead>
<tbody>
<tr>
<td>H₀₁</td>
<td>.307</td>
<td>Rejected</td>
</tr>
<tr>
<td>H₀₂</td>
<td>.864</td>
<td>Rejected</td>
</tr>
<tr>
<td>H₀₃</td>
<td>.056</td>
<td>Rejected</td>
</tr>
<tr>
<td>H₀₄</td>
<td>.089</td>
<td>Rejected</td>
</tr>
<tr>
<td>H₀₅</td>
<td>.205</td>
<td>Rejected</td>
</tr>
<tr>
<td>H₀₆</td>
<td>.038</td>
<td>Failed to reject</td>
</tr>
</tbody>
</table>
CHAPTER FIVE

Summary and Discussion

Introduction

The purpose of the current quasi-experimental study was to examine whether a statistically significant difference existed in the student achievement of Mississippi students in grades four, five, and six in the subjects of language arts and mathematics based on departmentalized and self-contained classroom structures. The measure utilized for the study was differences between MCT2 QDI-R values for the school years of 2009-2010 and 2010-2011; 2010-2011 and 2011-2012; and 2011-2012 and 2012-2013.

For the purpose of this study, departmentalized classroom structures are configured for students to receive instruction in core classes (reading, mathematics, language arts, science, and social studies) from different teachers. Departmentalization may consist of a different teacher for each subject, or the structure could be designed so teachers are responsible for multiple subjects. Self-contained classroom structures are designed for students to receive instruction for each core subject from a single teacher.

Chapter five provides a brief summary of the study. The chapter includes a discussion of the findings and limitations of the study, implications for practical and research applications, and recommendations for future research.

Summary of the Study

The following research question guided this study: is there a difference when comparing student performance in self-contained classroom structures to students in departmentalized
classroom structures in Mississippi schools measured by the aggregated differences in percentage of MCT2 performance levels in grades four, five, and six between SY 2009-2010 and 2010-2011, between SY 2010-2011 and 2011-2012, and between 2011-2012 and 2012-2013? The research hypotheses were:

$H_{o1}$: There is no significant difference in fourth grade student performance in language arts when comparing students in self-contained classroom structures to students in departmentalized structures.

$H_{o2}$: There is no significant difference in fourth grade student performance in mathematics when comparing students in self-contained classroom structures to students in departmentalized structures.

$H_{o3}$: There is no significant difference in fifth grade student performance in language arts when comparing students in self-contained classroom structures to students in departmentalized structures.

$H_{o4}$: There is no significant difference in fifth grade student performance in mathematics when comparing students in self-contained classroom structures against students in departmentalized structures.

$H_{o5}$: There is no significant difference in sixth grade student performance in language arts when comparing students in self-contained classroom structures against students in departmentalized structures.

$H_{o6}$: There is no significant difference in sixth grade student performance in mathematics when comparing students in self-contained classroom structures against students in departmentalized structures.

The independent variable of the study was classroom structure, divided into two levels:
departmentalized and self-contained. The structure of each school and grade level was determined through an email questionnaire or by phone call. The dependent variables were the changes in QDI-R percentages, a value generated specifically for this study. After generating QDI-R values for each school and grade level, changes in the values were found by subtracting QDI-R for SY 2009-2010 and 2010-2011; 2010-2011 and 2011-2012; and 2011-2012 and 2012-2013 for each school included in the study. The three differences were generated for both language arts and mathematics.

The population of the study included all Mississippi schools serving grades four, five, and six meeting the following criteria: schools were not missing any MCT2 data from any of the school years included in the study; schools had no changes in configurations leading to a new Mississippi school code; schools responded to a questionnaire or follow-up phone calls; and classroom structure for grade level did not change during the school years included in the study. The number of schools for fourth grade meeting the criteria was 247, with 176 (71%) structured as departmentalized and 71 (29%) structured as self-contained. The number of schools for fifth grade was 242, with 213 (88%) structured as departmentalized and 29 (12%) structured as self-contained. For sixth grade, there was a total of 207 schools meeting the criteria with 196 (95%) structured as departmentalized and 11 (5%) structured as self-contained.

A one-way MANOVA was conducted using SPSS, version 22 in order to determine if a significant difference existed between groups of each grade level for language arts and mathematics.

Summary of Findings

Results of the analyses found no significant differences between class structures in grade four language arts (p = .307) or mathematics (p = .246). When examining fifth grade results,
while there was no significant difference found, both language arts and mathematics were approaching a significant difference in both subjects with a p value of .056 and .089, respectively. There was no significant difference found between class structures when analyzing grade six language arts (p = .205). For sixth grade mathematics, there was a significant difference of .038 found between class structures on mean differences of QDI-R values. Because of the statistical findings, rejection of the null hypotheses was prevented for $H_{o1}$ through $H_{o5}$. Significant statistical findings for grade six mathematics led to rejection of the null hypothesis $H_{o6}$.

**Discussion of Findings and Limitations**

When undertaking this study, the researcher wanted to conduct an analysis of all Mississippi schools meeting the aforementioned criteria for being included in the population. With this being said, there were unexpected trends discovered during data collection and analysis.

With each grade level, the number of self-contained schools decreased, from 71 in fourth grade, to 29 in fifth grade, and to 11 in sixth grade. While the assumption of adequate sample size was met for each grade level, such unbalanced groups may influence statistical findings. Therefore, this is considered a limitation of the study.

There were outliers found within the data when conducting boxplot analyses. For example, in grade four language arts outlier 214 was labeled as 1.5 box-lengths from the edge of the box for the variable G41011LANG. Further investigation identified East Sunflower in Sunflower County as outlier 214. East Sunflower is considered an outlier for this dependent variable because the school’s QDI-R decreased 82.2 (-82.2) points from SY 2009-2010 to SY 2010-2011. While this is an outlier, it is an accurate depiction of the range of increases and
decreases in QDI-R for each dependent variable in each grade level. The researcher opted to keep the outliers as part of the study because these ranges of differences are the reality facing Mississippi educators. However, keeping the outliers may have influenced the findings of the MANOVA analysis, especially in grade six mathematics where a significant difference was found between structures, favoring departmentalization. The dependent variable causing the significant difference was G61112MATH. This variable had two extreme outliers, both of which were self-contained classrooms. This most likely had an effect on the results because there are only 11 total participants in this group. This may be a Type I error because the null hypothesis was rejected, when it could actually be true.

The inclusion of outliers in the study most likely led to the notable increases and decreases in the differences in means over the three data points for each structure. Therefore, the inclusion of outliers in the study is another limitation of the study.

Implications for Application and Future Research

This research provides limited evidence of an effect of classroom structure on student learning. Although this study found results similar to previous research (McGrath & Rust, 2002; Moore, 2008; Taylor-Buckner, 2014), it has led to more questions than answers related to student achievement in Mississippi schools.

Choice of School Structure. Based on the fact previous research suggests no real differences in student achievement based on structure, how do school leaders determine organizational structure for each grade level of their school? From this study, it is evident the number of self-contained schools decrease as grade levels increase. Based on results of the population of this study, there are 29 fifth grade self-contained Mississippi schools and 11 sixth grade self-contained Mississippi schools remaining in the state. Further research is needed to
determine why school leaders have chosen the organizational structure of their school.

Enrollment data for each school can be collected from MDE in order to determine whether total enrollment is a factor in structure school leaders choose. Qualitative and quantitative data can be collected from schools within the population of this study seeking to determine which structure is more beneficial for teacher morale.

**Teacher Quality.** Teacher quality was not factored into the outcome of the current study, although it is one of the most critical components of student achievement. Mississippi has developed and implemented the Mississippi Teacher Evaluation System (MTES), providing a rubric for the evaluation and scoring of teachers based on certain criteria. The overall MTES score is reported to MDE at the end of the school year. Further research could be conducted by attaining teacher level MCT2 data from each school and MTES scores. From this data, the researcher may be able to determine if there is a relationship between QDI-R differences, the organizational structure, and teacher quality based on the MTES scores. Supplemental findings from this research include being able to determine the effect of average teacher salary on teacher quality, and regions of the state employing the lowest quality teachers based on MTES. This information may be beneficial for state, district, and school leaders when making decisions concerning teacher pay, focused locations for incentive pay, and targeted professional development.

Another addition to this study may be to determine the relationship between teacher years of service, QDI-R differences, and MTES scores. A researcher may also wish to compare MTES scores based on teacher preparation programs, whether they be traditional or alternate route. Such comparisons can lead to teachers being more thoroughly prepared for the classroom when they enter the profession.
When considering teacher quality, future research could also investigate teachers’ level of preparedness for teaching in a departmentalized setting. Teachers may or may not be provided with opportunities for collaboration with other teachers. Schools providing and requiring collaboration amongst teachers may demonstrate higher student achievement than those schools who do not provide and require this time. This collaboration time may prevent teaching in isolation, and may assist teachers with preparing more quality lessons for the students.

**School Leader Quality.** The quality of the school leader was not taken into consideration for the sake of this study. However, a school leader’s effectiveness is vital to increases in student achievement. Along with the MTES, Mississippi has also implemented the Mississippi Principal Evaluation Instrument (MPES). District leaders evaluate and assign a score to principals and assistant principals. A researcher may further this study by seeking to determine if there is a relationship between school leaders’ MPES scores and QDI-R differences.

**Early Learning Programs.** Based on considerable increases and decreases in QDI-R differences for many schools included in this study, the researcher began to question if early learning programs such as pre-kindergarten or Head Start programs had an effect on student achievement. This study could be extended by comparing the effect of school structure on QDI-R values when controlling for schools with early learning programs.

**Conclusions**

The current study found no significant differences in grades four, five, and six language arts, and no significant difference was found between grades four and five mathematics. There was a significant difference in grade six mathematics, favoring departmentalization; however, the results may be a Type I error due to the small number of grade six self-contained schools and outliers included in the study. Although there are many factors determining the success of
Mississippi schools in increasing student achievement, research is vital in deciding which of these factors are most effective.
BIBLIOGRAPHY


Lund, A., & Lund, M. (2013). One way MANOVA is SPSS. Available from


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http://www.cis.drexel.edu/faculty/shelfer/public_html/busrefpapers/edu.htm


LIST OF APPENDICES
APPENDIX A

Email Questionnaire
Hello,

My name is Carrie Skelton. I am conducting research for my dissertation as a Ph.D. in Educational Leadership candidate from The University of Mississippi. The purpose of my research is to compare the effectiveness of self-contained and departmentalized classroom structures on student achievement for 4th, 5th, and 6th grade students in Mississippi public schools. I will be using MCT2 data for the years 2010, 2011, 2012, and 2013, but I am asking for your help in categorizing the data into the appropriate category, self-contained or departmentalized, by completing this very brief survey. I realize you are busy so if it would be more convenient, feel free to have another staff member complete it.

Please select the classroom structure utilized for each grade served in your school for each of the school years. For the sake of this study, team teaching is categorized as departmentalized.

Thank you very much for your assistance,

Carrie Skelton

<table>
<thead>
<tr>
<th>School Year</th>
<th>4th Grade</th>
<th>5th Grade</th>
<th>6th Grade</th>
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APPENDIX B

Grade Four SPSS Boxplots
Represents univariate outliers 1.5 boxlengths from edge of box.
- Represents univariate outliers 1.5 boxlengths from the edge of the box.
APPENDIX C

Grade Four Pearson \((r)\) Correlation Tables
### Grade 4 Language Arts Pearson (r) Correlation for Multicollinearity Determination

<table>
<thead>
<tr>
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<th>G41213LANG</th>
</tr>
</thead>
<tbody>
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<td>G41213LANG</td>
<td>Pear son (r)</td>
<td>.193**</td>
<td>-.275**</td>
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</table>

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

### Grade 4 Mathematics Pearson (r) Correlation for Multicollinearity Determination

<table>
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<tr>
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<tbody>
<tr>
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<td>Pear son (r)</td>
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<td>Pear son (r)</td>
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<td>G41213MATH</td>
<td>Pear son (r)</td>
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<td>-.236**</td>
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**. Correlation is significant at the 0.01 level (2-tailed)
APPENDIX D

Scatterplot Matrices for Grade 4 Language Arts
APPENDIX E

Scatterplot Matrices for Grade 4 Mathematics
APPENDIX F

Grade Four Mahalanobis Distance Results
### Mahalanobis Distance results for grade 4 language arts

<table>
<thead>
<tr>
<th>School Name</th>
<th>Class Structure</th>
<th>MAH_1</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pineville Elem</td>
<td>D</td>
<td>19.51529*</td>
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<tr>
<td>French Elem</td>
<td>D</td>
<td>17.83854*</td>
</tr>
<tr>
<td>Heidelberg School</td>
<td>S</td>
<td>17.34576*</td>
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<td>Brown Elem</td>
<td>S</td>
<td>16.91066*</td>
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*Value greater than 16.27 is a multivariate outlier.

### Mahalanobis Distance results for grade 4 mathematics

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<tr>
<th>School Name</th>
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<th>MAH_2</th>
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<tr>
<td>Heidelberg School</td>
<td>S</td>
<td>20.05261*</td>
</tr>
<tr>
<td>French Elem</td>
<td>D</td>
<td>17.83854*</td>
</tr>
</tbody>
</table>

*Value greater than 16.27 is a multivariate outlier.
APPENDIX G

Grade 5 SPSS Boxplots
○ Represents univariate outliers 1.5 box-lengths from the edge of the box.
* Represents univariate outliers 3 box-lengths from the edge of the box.
○ Represents univariate outliers 1.5 box-lengths from the edge of the box.
* Represents univariate outliers 3 box-lengths from the edge of the box.
APPENDIX H
Grade 5 Pearson (r) Correlation Tables
### Grade 5 Language Arts Pearson \((r)\) Correlation for Multicollinearity Determination

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<td>1</td>
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<tr>
<td>G51213LANG</td>
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<td>0.146*</td>
<td>-0.520**</td>
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** Correlation is significant at the 0.01 level (2-tailed)
* Correlation is significant at the 0.05 level (2-tailed)

### Grade 5 Mathematics Pearson \((r)\) Correlation for Multicollinearity Determination

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<td>0.147*</td>
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** Correlation is significant at the 0.01 level (2-tailed)
* Correlation is significant at the 0.05 level (2-tailed)
APPENDIX I

Scatterplot Matrices for Grade 5 Language Arts
APPENDIX J

Scatterplot Matrices for Grade 5 Mathematics
APPENDIX K

Grade 6 SPSS Boxplots
Represents univariate outliers 1.5 box-lengths from the edge of the box.
○ Represents univariate outliers 1.5 box-lengths from the edge of the box.
* Represents univariate outliers 3 box-lengths from the edge of the box.
APPENDIX L

Grade 6 Pearson ($r$) Correlation Tables
### Grade 6 Language Arts Pearson (r) Correlation for Multicollinearity Determination

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<td>-0.386**</td>
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<td>Pearson (r)</td>
<td>0.070</td>
<td>-0.396**</td>
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** Correlation is significant at the 0.01 level (2-tailed)

### Grade 6 Mathematics Pearson (r) Correlation for Multicollinearity Determination

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<td>Pearson (r)</td>
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** Correlation is significant at the 0.01 level (2-tailed)
APPENDIX M

Scatterplot Matrices for Grade 6 Language Arts
APPENDIX N

Scatterplot Matrices for Grade 6 Mathematics
CLASSTYPE: Departmentalized

CLASSTYPE: Self-Contained
APPENDIX O

Grade 6 Mahalanobis Distance Results
### Mahalanobis Distance results for grade 6 language arts

<table>
<thead>
<tr>
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<tr>
<td>R.H. Bearden Elem</td>
<td>D</td>
<td>20.23220*</td>
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<tr>
<td>Falkner Elem</td>
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<td>18.39903*</td>
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<td>West Kemper Elem</td>
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*Value greater than 16.27 is a multivariate outlier.

### Mahalanobis Distance results for grade 6 mathematics

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<td>16.69129*</td>
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*Value greater than 16.27 is a multivariate outlier.
VITA

Carrie R. Skelton

**Education**

<table>
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<th>Date</th>
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<td><strong>Union University</strong></td>
<td>M.Ed.</td>
<td>Major: Curriculum &amp; Instruction</td>
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<tr>
<td>May 2002</td>
<td><strong>Delta State University</strong></td>
<td>B.S.E.</td>
<td>Major: Social Science Education</td>
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**Professional Experience**

**Marshall County School District; Holly Springs, MS**

**Curriculum Director—June 2014 --Present**

- Monitor and improve Response to Intervention process and effectiveness at each school
- Evaluate, purchase, and monitor usage and effectiveness of educational programs at each school
- Provide professional development for teachers and administrative teams
- Monitor and provide feedback for principals on the Mississippi Teacher Evaluation System
- Perform drop-in observations at school sites for monitoring and improvement of instruction
- Provide support for administrators and staff
- Coordinate dual enrollment—recruit qualified students, assist with application process, work with counselors’ on monitoring student progress throughout courses
- Textbook Coordinator—Assist principals with keeping textbook inventories current in Mississippi’s Textbook Inventory Management System (TIMS), work with principals and school staff in choosing new purchases based on budget, textbook adoption, and school needs; attend textbook caravans and evaluate samples

**District Test Coordinator—February 2014 – Present**

- Develop and disseminate District Test Security Plan
- Develop policies and procedures ensuring maximum test security in coordination with Mississippi Department of Education and testing publishers
- Implement and enforce effective security measures for test materials and testing practices
- Provide guidance for School Test Coordinators in understanding duties and responsibilities
- Disseminate and collect test materials
Conduct audits to ensure district policies and procedures are implemented correctly
- Investigate and report test irregularities to the Superintendent and the Office of Student Assessment
- Communicate with Technology Coordinator ensuring all equipment is ready for online assessment
- Assist School Test Coordinators with validating student rosters, training and troubleshooting for online assessment sites such as PearsonAccess.com or PearsonAccessNext.com
- Ensure all students requiring accommodations receive those accommodations and monitor all documentation ensuring those accommodations are not given illegally
- Monitor and assist with intervention programs for students failing a required state assessment

Assistant Principal/Instructional Facilitator—August 2009 – June 2014
- Monitor and assess the instructional program
  - Implement data-driven best practices in lesson planning; model effective lessons; Conduct professional development sessions; Evaluate and critique teachers; Continuously evaluate and adjust school instructional program; Develop incentive programs for students;
- Supervise the student body
  - Implement and utilize Positive Behavior Intervention System; Assign consequences according to district handbook; Conduct parent conferences; Develop behavior plans; Mentor students
- Response-to-Intervention
  - Devise and implement safety nets for struggling learners; Monitor student progress and revise learning program as needed;
- Maintenance/Custodial Staff Supervisor
  - Monitor cleanliness of classrooms and facilities; Assign repairs for maintenance staff and ensure repairs are completed; Assist custodians/maintenance staff with monthly orders; oversee summer work projects at school level
- Campus Transportation Supervisor
  - Resolve complaints from parents, drivers, and students
  - Monitor bus cleanliness and maintenance upkeep

School Test Coordinator—August 2009 – February 2014
- Developed and disseminated School Test Security Plan in accordance with District Test Security Plan
- Worked in conjunction with District Test Coordinator ensuring maximum test security with district policy, Mississippi Department of Education, and testing publishers
- Provided guidance and training for test administrators and proctors
- Issued and collected test materials
- Monitored testing practices and procedures

School Level Federal Programs Coordinator—August 2009 – August 2013
- Develop budgets and monitor expenditures of local budgets and funds associated with federal grants
• Wrote grants to secure federal funds
• Correspond with committee of stakeholders seeking input for expenditures of funds

**Yearbook Coordinator—August 2008 – June 2009; August 2012 – Present**
• Take photographs of students
• Recruit and supervise yearbook committee
• Schedule school picture dates
• Conduct fundraisers
• Supervise creation of yearbook
• Sell and deliver yearbooks

**Teacher—August 2002 – July 2009**
• Taught the following Language Arts classes:
  - Learning Strategies
  - English I
• Taught the following Social Science classes:
  - Middle School World History
  - Middle School U.S. History
  - Mississippi Studies
  - Introduction to World Geography
  - Advanced World Geography
  - Psychology
  - Sociology
  - Introduction to Law
• Mentor Teacher

**Coach—August 2003 – July 2009**
• Head Volleyball Coach
  • During first year of program, team advanced to North Half of Mississippi tournament
• Assistant Girls’ Basketball Coach
  • During 05-06 season, girl’s team was first to advance to state tournament (Final Four)
• Assistant Girls’ Softball Coach

**Certifications**

**National Institute for School Leadership (NISL)**

**Mississippi Educator Licensure Endorsements:**
Career Level Administrator; English (7-12); Social Sciences (7-12)
License Number: 176798

**Tennessee Educator Licensure Endorsement:**
Beginning Administrator (Pre K-12)
License Number: 000270232
Texas Educator Licensure Endorsement:
Principal (EC-12); Superintendent (EC-12)

Arkansas Educator Licensure Endorsement:
English (7-12); Building Level Administrator (P-12)

Research, Publications


Grants

Mississippi Department of Education, 1003A School Improvement Grant, Byhalia Middle School, 2009 – 2010. $144,728.80

Mississippi Department of Education, 1003A School Improvement Grant, Byhalia Middle School, 2010 – 2011. $57,461.48

Mississippi Department of Education, 1003A School Improvement Grant, Byhalia Middle School, 2011 – 2012. $20,709.83

Mississippi Department of Education, 1003A School Improvement Grant, Byhalia Elementary School, 2012-2013. 46,905.59

Professional Organizations

Association for Supervision and Curriculum Development (ASCD)
Mississippi Professional Educators (MPE)