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## The Impact Of Grade Configuration On Sixth Grade Academic Achievement In Florida Public Schools

Karen Schafer  
*University of Central Florida*



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THE IMPACT OF GRADE CONFIGURATION ON  
SIXTH GRADE ACADEMIC ACHIEVEMENT IN FLORIDA PUBLIC SCHOOLS

by

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A dissertation submitted in partial fulfillment of the requirements  
for the degree of Doctor of Education  
in the Department of Educational Research, Technology and Leadership  
in the College of Education  
at the University of Central Florida  
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Major Professor: Barbara Murray

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## ABSTRACT

This study examined the impact of grade span configuration on the academic achievement of sixth grade students in Florida public schools. Grade configuration (PK-6, PK-8, and 6-8) was the independent variable. Academic achievement, the dependent variable, was measured using 2009 Florida Comprehensive Assessment Test (FCAT) Reading and Mathematics mean scale scores and the percentage of students making annual learning gains from 2008 to 2009. School socioeconomic status (SES) was used as a covariate to equalize the effect of poverty on achievement. Random samples of schools were drawn from the population of all Florida public schools with sixth grades in 2009, and from Florida's 2009 Academically High Performing School Districts.

Findings showed that there was a statistically significant difference in achievement based on grade level configuration in reading and mathematics for all schools and for schools in Academically High Performing Districts. In all cases, the PK-6 configuration was statistically significantly higher than 6-8, with varied significance between PK-6 and PK-8, and PK-8 and 6-8. The strongest practical significance for all schools was found for learning gains in mathematics, with 26% of the variance in mean learning gain percentages accounted for by grade configuration when controlling for SES.

Recommendations were made that future studies address differentiating grade configurations by instructional models and other factors that could impact achievement. The degree and the fidelity to which the middle school concept is implemented in 6-8 schools should be accounted for before making conclusions about the impact of configuration on academic achievement of students in that configuration.

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Call it a clan, call it a network, call it a tribe, call it a family.

Whatever you call it, whoever you are, you need one. ~Jane Howard

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## CHAPTER 1 INTRODUCTION

An issue that has reemerged in cities and school districts throughout the United States is grade span configuration for schools, particularly schools with students in the middle grades. As instructional and civic leaders consider ways to maximize educational opportunities for students and to improve their achievement, especially in response to the demand for increased accountability, the idea of grade span grouping has taken on renewed importance.

This most recent emphasis on academic excellence in the middle school and a demand for finding the best grade level configuration to achieve it has been fueled by the standards and accountability movement, particularly by Public Law 107-110, the No Child Left Behind Act of 2001 (NCLB) (U.S. Department of Education, 2001). NCLB was signed into law on January 8, 2002 as an amendment to and reauthorization of the Elementary and Secondary Education Act of 1965 (ESEA). One of the law's four main goals is to assess student progress and hold schools, districts, and states accountable for student progress and for closing the achievement gap. "Stronger accountability for results" is described as one of the Four Pillars of NCLB:

Under No Child Left Behind, states are working to close the achievement gap and make sure all students, including those who are disadvantaged, achieve academic proficiency. Annual state and school district report cards inform parents and communities about state and school progress. Schools that do not make progress must provide supplemental services,...take corrective actions, and, if still not making adequate yearly progress after five years, make dramatic changes to the way the school is run. (U.S. Department of Education, 2004).

The primary focus of NCLB for schools has been meeting the annual state-mandated interim targets as they work toward the expectation that 100% of students will

attain proficiency (be on grade level), as defined by each state, by the end of the 2013-2014 school year. Proficiency is determined by the mandatory participation of all public school students in grades 3-8 in statewide testing programs that assess state standards in reading and mathematics. Annual proficiency results are used to determine whether schools have achieved Adequate Yearly Progress (AYP). Schools that do not meet the proficiency targets for all students in the school and for each federally defined subgroup are deemed not to have made AYP and may be subject to federal sanctions.

The impact of NCLB has been significant and far-reaching, becoming a central focus of policy and politics at all levels of education. NCLB requires accountability for all grade levels traditionally encompassed by the middle grades, providing an impetus for demanding middle school reform with a focus on academic excellence. Juvonen, Kaganoff, Le, Augustine, and Constant (2004) summarized the performance of middle level students on NCLB accountability assessments, underscoring the need for change: “The majority of [middle level] students nationwide failed to reach the proficient level, regardless of subject area tested. Approximately one-third of eighth graders nationwide attained proficiency in mathematics (27%), science (32%), and reading (33%)” (p. 40).

A part of the middle school reform movement has been a renewed debate on which grade span configuration best meets adolescents’ academic as well as developmental needs. Much of the debate has focused on placement of the sixth grade. Nationally, the data show that the most popular configurations that include sixth grade continue to be Prekindergarten/Kindergarten (PK)-6 and 6-8 (NCES) (2006). The reasons for the popularity of these grade configurations, however, may have little to do with best meeting student needs or promoting academic excellence. Renchler (2000)

averred that “the exigencies of geographic location, student populations, limited financial resources, and community preferences, among other factors, may often dictate the grade spans within a school system, hence the wide range of different grade configurations across the nation” (p. 1).

Juvonen, et al. (2004) summarized the findings of several studies on middle school configurations by saying, “The scientific rationale for creating separate schools for young adolescents [is] weak” (p. 113). They continued:

Middle schools have become the norm more because of social and demographic pressures than because of scientific evidence supporting the need for a separate school for young teens. Not only is evidence showing that young teens benefit from a separate three years of schooling weak, there is strong evidence suggesting that transitions (especially if they involve several changes in the school environment and instruction) have at least temporarily negative effects on some youth. Separate elementary schools and middle schools cause transition problems for students that can negatively affect their developmental and academic progress. In short, the research findings indicate that the separate middle school has weak empirical support. (p. 113)

This debate about whether students in sixth grade are better served academically in an elementary configuration, typically with a single teacher in what is sometimes perceived to be a more nurturing environment, or a secondary configuration in which they attend classes with as many as seven different subject area experts in a school with older students, is one that has been answered in different ways throughout the history of American education. As the unique needs and characteristics of early adolescents have been recognized, educators have considered structural options, including grade span configuration, to help meet those needs.

This study focused on the academic success of Florida’s sixth grade students in elementary and secondary grade level configurations. The study is significant because, as



the review of research revealed, the impact of grade configuration on middle level students had not been previously studied in Florida. A Florida study is significant because the majority of its sixth grade students are in 6-8 configured schools, whereas nationally, the majority of students in grade 6 are in kindergarten through sixth grade configurations.

The large proportion of 6-8 Florida schools is, to some degree, a result of a tremendous push toward “implementing middle schools in Florida, a process that began in the late 1960’s and continued for the next three decades” (George, 2009, p. 9). A part of the process for many of the schools and districts included adoption of the middle school concept, a philosophy and educational model directed at meeting the intellectual, developmental, and social needs of early adolescents. “There were, to be sure, dozens, perhaps even hundreds, of Florida educators who immediately saw the relevance of the new model of middle level education and became early, enthusiastic, fully committed converts to the middle school concept” (George, p. 9) as espoused by the Florida League of Middle Schools and the National Middle School Association. This study examined the impact of grade configuration in a state with a historic commitment to middle level education and the majority of its schools in a 6-8 configuration.

#### Purpose of the Study

The purpose of this study was to determine whether grade level configuration as structural element of school design in public schools had an impact on academic achievement for students in grade 6, specifically in mathematics and reading. The desired outcome was to generate information about grade span configuration that

educational leaders, as well as civic leaders and other decision-makers, can use to create better learning environments to maximize student achievement and success.

### Statement of the Problem

The problem posed in the study was whether Florida's sixth grade students in public schools, including Florida's public charter schools, demonstrated significantly different academic achievement in mathematics and reading dependent on the grade span configuration of the school. For purposes of this study, academic achievement was measured using (a) school mean scale scores on the Florida Comprehensive Assessment Test (FCAT) and (b) the percentages of students at each school that made annual learning gains. Annual learning gains in Florida are defined as one year's academic growth as measured by a comparison of sequential FCAT scores.

## Research Questions and Hypotheses

The problem statement can be summarized by the question “To what extent does the reading and mathematics achievement of sixth grade students differ based on the grade configuration of the school?” The study was guided specifically by the following research questions:

1. To what extent does sixth grade reading achievement of schools, as measured by mean scale score on FCAT Reading, differ based on the grade configuration of the school when controlling for socio-economic status of the school?

$H_0$ : There is no statistically significant difference in school sixth grade mean scale scores on FCAT Reading based on the grade configuration of the school when controlling for socio-economic status of the school.

2. To what extent does sixth grade mathematics achievement of schools, as measured by mean scale score on FCAT Mathematics, differ based on the grade configuration of the school when controlling for socio-economic status of the school?

$H_0$ : There is no statistically significant difference in school sixth grade mean scale scores on FCAT Mathematics based on the grade configuration of the school when controlling for socio-economic status of the school.

3. To what extent does sixth grade reading achievement of schools, as measured by the percentage of students making learning gains on FCAT Reading, differ based on the grade configuration of the school when controlling for socio-economic status of the school?

$H_0$ : There is no statistically significant difference in the percentage of sixth grade students demonstrating learning gains as reported by school on FCAT Reading based on the grade configuration of the school when controlling for socio-economic status of the school.

4. To what extent does sixth grade mathematics achievement of schools, as measured by the percentage of students making learning gains on FCAT Mathematics, differ based on the grade configuration of the school when controlling for socio-economic status of the school?

$H_0$ : There is no statistically significant difference in the percentage of sixth grade students demonstrating learning gains as reported by school on FCAT

Mathematics based on the grade configuration of the school when controlling for socio-economic status of the school.

5. To what extent does sixth grade reading achievement of schools, as measured by mean scale score, differ based on the grade configuration of schools in Florida districts designated as Academically High Performing?

$H_0$ : There is no statistically significant difference between mean scale scores of schools on sixth grade FCAT Reading based on the grade configuration of schools in Florida districts designated as Academically High Performing.

6. To what extent does sixth grade mathematics achievement of schools, as measured by mean scale score, differ based on the grade configuration of schools in Florida districts designated as Academically High Performing?

$H_0$ : There is no statistically significant difference between mean scale scores of schools on sixth grade FCAT Mathematics based on the grade configuration of schools in Florida districts designated as Academically High Performing.

7. To what extent does sixth grade reading achievement of schools, as measured by the percentage of students making learning gains, differ based on the grade configuration of schools in Florida districts designated as Academically High Performing?

$H_0$ : There is no statistically significant difference in the percentage of sixth grade students demonstrating learning gains as reported by school on FCAT Reading based on the grade configuration of schools in Florida districts designated as Academically High Performing.

8. To what extent does sixth grade mathematics achievement of schools, as measured by the percentage of students making learning gains, differ based on the grade configuration of schools in Florida districts designated as Academically High Performing?

$H_0$ : There is no statistically significant difference in the percentage of sixth grade students demonstrating learning gains as reported by school on FCAT Mathematics based on the grade configuration of schools in Florida districts designated as Academically High Performing.

## Delimitations

The study was delimited to the reporting of the reading and mathematics results of the 2009 Florida Comprehensive Assessment Test (FCAT) for all Florida public schools with sixth grades. It was further delimited to the inclusion of schools for which both 2009 FCAT data and 2009 Florida School Grade data were available for sixth grade. Academic achievement was defined by performance on a single indicator, FCAT. To narrow the scope of the research, only schools with configurations of prekindergarten or kindergarten-6 (PK-6), prekindergarten or kindergarten-8 (PK-8), and 6-8 were included in the study. These three configurations accounted for 90% of the schools with sixth grades in Florida. This study did not address other variables that could be indicators of the success of particular grade span configurations, such as attendance, student behavior, or attitudes. It also evaluated grade span configuration based on the student achievement data of schools, not of individual students. These delimitations imply that the results of the study can not be generalized to other grade levels in Florida, to schools with sixth grade students in other states, or to different grade span configurations that include sixth grade.

## Limitations

The factors which limited the validity of the research included the following:

1. the inherent differences in school demographics that impacted student achievement beyond grade level configuration, including race, ethnicity, home language, gender, or level of parent education,
2. the differences amongst schools in the proportion of their populations of students with disabilities and English Language Learners (ELL),

3. the restriction of the calculation of learning gains for schools to those students with both 2008 and 2009 FCAT scores, thus having eliminated some students from inclusion in school results data,
4. the lack of a direct measure of socio-economic status to use as a control, having used instead the percentage of students at the school participating in the Federal free or reduced price lunch program as a proxy,
5. the lack of information as to whether K-8 schools included their sixth grade students as a part of an elementary or secondary configuration,
6. the lack of information on the instructional model employed with sixth grade students: whether schools used the middle school model or a traditional secondary model, or whether sixth grade students were in a departmentalized or team-teaching design, and
7. the imbalance of school types by configuration, with the majority of Florida's sixth grade students in 6-8 middle schools, fewer in K-6 elementary schools, and even fewer in K-8 combination schools.

#### Definition of Terms

1. Academic Achievement: School performance on the Florida Comprehensive Assessment Test (FCAT) in mathematics and reading as measured by mean scale scores and percentage of students making learning gains.
2. Academically High Performing District: Designation awarded to Florida districts determined to have met eligibility criteria established in Florida law, Section 1003.621, F.S.: a district must (a) earn a district grade of "A" under s. 1008.34(7), F.S. for two consecutive years, (b) have no district operated schools earn a grade

of “F” in the most recent year under s. 1008.34, F.S., (c) comply with all class size requirements in s. 1, Art. IX of the Florida Constitution and s. 1003.03, F.S. in the current year, and (d) meet audit compliance standards under s. 218.39, F.S. (Academically High Performing Districts, 2009).

3. Charter School: Public school of choice authorized by, but operated independently of, the local school board (Florida State Statute, Student and Parental Rights and Educational Choices, 2009).
4. Florida Comprehensive Assessment Test (FCAT): Florida’s statewide criteria-referenced assessment for students in grades 3-11 that measures achievement of the Sunshine State Standards in reading (gr. 3-10), mathematics (gr. 3-10), science (gr. 5, 8, 11), and writing (gr. 4, 8, 10) (Florida Department of Education, 2005).
5. Free or Reduced-Price Lunch: “The National School Lunch Program (NSLP) is a federally assisted meal program operating in public and nonprofit private schools and residential child care institutions” to provide well-balanced, nutritionally complete low-cost or free lunches to qualifying children each school day (U.S. Department of Agriculture Food and Nutrition Service, 2008, National School Lunch section, para. 1).
6. Grade Span Configuration: “The range of grades a school comprises” (Coladarci & Hancock, 2002, p. 2). This study focuses on grade span configurations that include sixth grade, specifically PK-6, PK-8, and 6-8.
7. Learning Gain: Measure of student academic growth calculated by comparing a student’s prior year FCAT score in reading or mathematics to the current year

score to determine whether at least one year of academic growth occurred as defined by Florida Statute (Florida State Statute, Assessment and Accountability, 2009). The percentage of students making learning gains is used as a part of the calculation of the Florida School Grade.

8. Scale Score: Measure of student results on FCAT Reading and Mathematics ranging from 100 to 500 points at each grade level.
9. School Grade: Letter grade of A, B, C, D, or F assigned to a school based on student proficiency in reading, mathematics, science and writing as determined by performance on the Florida Comprehensive Assessment Test (FCAT); part of Florida's accountability system.
10. School Mean Scale Score: Average of student FCAT scale scores for each grade level at a school for the reading, mathematics, and science portions of the test
11. Sunshine State Standards (SSS): "Florida's curriculum framework that provides guidelines for what students should know and be able to do in each subject at each grade" (Florida Department of Education, 2005). FCAT measures student achievement of the Sunshine State Standards.



## Theoretical Framework

A central precept of this study is that grade configuration, as a structural element of school design, may exert a significant impact on student achievement. Pertinent to that discussion is the question of whether structural elements of a school are related to that school's climate.

Sweetland and Hoy (2000) defined climate as “a general concept used to capture the basic and enduring quality of organizational life” (p. 705). Climate is also connected to the actions and the behavior of an organization's, or a school's, members. “School climate is a relatively enduring character of a school that is experienced by its participants, that affects their actions, and that is based on the collective perceptions of behavior in the school” (Hoy, 2000).

Researchers have found climate to be related to student achievement. Hoy (2000) concluded from his research that “empirical evidence has linked school climate with achievement” (School Climate and Outcomes section). Other researchers have also connected a healthy school climate to improved academic performance (Fredericks, Blumenfeld, & Paris (2004); Hoy, Hannum, & Tschannen-Moran (1998); McPartland, Balfanze, Jordon, & Legters (1998); Purkey & Smith (1983)).

Owens and Valesky (2007) described the theoretical work of Tagiuri on school climate. They described Tagiuri's definition of organizational climate as being composed of four dimensions: milieu, culture, ecology, and organization (p. 187). Milieu refers to human social system factors such as morale, values, leadership, relationships, and socio-economic status as they relate to the climate of the organization. Culture is that part of climate that encompasses the “values, belief systems, norms, and ways of thinking that

are characteristic of the people in the organization” (p. 188). Ecology refers to the impact on school climate of physical and material factors, such as the condition or design of the building, books, desks, technology, and class change bells. Ecology also encompasses the impact on climate of “pedagogical inventions,” such as “student grouping” (p. 187). Finally, the organization dimension includes those components that impact climate through structural factors, including how decisions are made, who is making them, and how they are being communicated, as well as the formal structures and organizational patterns of the school, which could include grade span configurations. Much of the organization dimension of climate arises from factors that administrators control directly or strongly influence. “It is important...that administrators understand the close connections between the choices they make about the way they organize and the climate manifested in the organization” (Owens & Valesky, p. 188). Under Tagiuri’s theoretical construct, school climate is influenced by structural elements such as grade configuration through both the ecology and the organizational milieu.

Linking student achievement to the organizational or structural element of school climate through the single variable of grade span configuration can, however, be problematic. Modern organizational systems theory acknowledges the difficulty of using a strictly scientific approach to attribute a specific outcome in education, or in any complex organization, to any one particular variable. Berrien explained that systems theory defines an organization as “an integrated system of interdependent structures and functions” (as cited in Owens & Valesky, 2007, p. 124) in which “all observations of nature are embedded in complex, dynamically interactive systems” (Owens & Valesky, p. 442). Systems theory holds that individual parts of a system must be examined within the

context of their relationships to each other and against other systems, and not in isolation. Only by understanding the linkages and interactions between the component parts of the system, can the system as a whole be understood (Senge, 1990). It is this inextricable connection between all components of an organization that makes it difficult to link student achievement, or any one particular variable, to any one isolated factor, such as grade configuration. It is also what makes it difficult to attribute a cause and effect relationship to a variable or to a set of variables. Owens and Valesky addressed the issue:

There is a strong tendency in our culture to ascribe single causes to events; in fact, the causes of even relatively simple organizational events are often very complex. We may be unwilling to accept this fact and, as a way of rejecting it, choose to apply simplistic cause-and-effect logic to our problems... Systems theory, then, puts us on guard against the strong tendency to ascribe phenomena to a single causative factor. (p. 125, 126)

Modern researchers have tackled issues of systems complexity in their research by designing sophisticated studies that deal with the association of significant variables and consider cause and effect relationships. Studies have been conducted that sought to link organizational culture and climate to organizational effectiveness (Owens & Valesky, 2007, p. 206). Owens and Valesky explained that “we must remember that the school is an open system, interactive with and responsive to its external environment. Though organizational culture focuses on the internal arrangements of schools, those always reflect, to some degree, the larger environment of the school’s situation” (p. 207).

Owens and Valesky (2007) referenced the work of Brookover, Rutter, Epstein, and Moos to support “the mounting evidence in the literature that the learning and development of students are significantly influenced by characteristics of classroom organizational culture” (p. 209). They summarized Moos’ findings that “students’ learning and development are strongly influenced by the nature and qualities of the

person-environment interaction” in schools and that organizational culture is “influenced not only by the interaction-influence system of the group, but also by other factors in the environment such as room design, schedule of activities, and layout of the building” (p. 210). In other words, structural elements in schools impact student learning. Owens and Valesky continued:

In his [Moos’] view, our knowledge of the causes and effects of organizational culture enables us to create and manage specified learning environments by controlling critical variables (such as competition, intellectuality, and formal structure). This, in turn, improves our ability to place students in the settings best suited to their needs – settings in which they will feel most comfortable and be most successful. (p. 210)

Research translated to theory provides a framework for understanding that grade configuration, as a structural element related to school culture and climate, may exert a significant impact on student achievement. Owens and Valesky (2007) stated that:

Clearly establishing...causal connections in schooling is hampered by the extraordinary complexity of the organization and the confusion and ambiguity among and between various constituencies of schools concerning the criteria for determining what high performance is in a school. A substantial and growing body of empirical evidence, derived from rigorous research in schools and other educative organizations, indicates that the effectiveness of these organizations, in terms of student learning and development, is significantly influenced by the quality and characteristics of the organizational culture...The concepts arising from this body of research make it possible and practical to plan and manage organizational culture purposefully. (p. 221)

The research conducted in this study was based on the theoretical framework that structural elements such as grade level configuration, as a component of school climate, impact school effectiveness measures, including student achievement. This is significant because administrative decisions that impact school culture and climate, including those related to structural elements, impact educational outcomes. Structural elements, those components of climate and culture included in Tagiuri’s organizational dimension, are

often the elements over which school leaders have the most control. “Much of the organization dimension of climate arises from factors that administrators control directly or strongly influence. It is important, we think, that administrators understand the close connections between the choices they make about the way they organize and the climate manifested in the organization” (Owens & Valesky, 2007, p. 188). This is especially true during this era of heightened accountability and global competition, when the consequences of those decisions carry such high stakes.

## Overview of Methodology

### *Research Design*

This quantitative, ex-post facto, non-experimental research study was designed to test whether a significant difference in means existed in achievement measures for schools that included sixth grade based on their grade span configurations. Statistical tests were run using pre-existing/archival data provided publicly by the Florida Department of Education (FLDOE), primarily on its website. The data were accessed from several different FLDOE sites, including those that listed 2009 FCAT results by subject, by school, and by grade level and those that provided 2009 School Grade data.

Data from each of the websites were matched by schools with sixth grades and compiled in Microsoft Excel. These data were then put into the software program Statistical Package for the Social Sciences (SPSS) for statistical analysis.

### *Population*

The population for the study was comprised of the public schools in Florida identified as including sixth grade on the Florida Department of Education’s 2009 Master

School Identification (MSID) file, which included each school's grade configuration. The study population included Florida public charter schools, but excluded schools not associated with one of Florida's 67 school districts (i.e., virtual schools or university lab schools). Schools that did not have enough students for the FLDOE to assign a sixth grade FCAT mean scale score to the school and schools that did not generate a School Grade were also excluded. Schools with grade level configurations of PK-6, PK-8, or 6-8, configurations which represented 90% of the schools that included grade 6 in Florida in 2009, comprised the population from which the samples were taken.

### *Sample*

Random samples were selected from each of the primary grade level configurations in order to create equal sized groups to run an analysis of covariance (ANCOVA). These samples were used to test for significant differences in mean scale scores and learning gains in reading and mathematics between schools with different grade span configurations. A random sample of schools was also selected from amongst schools in Academically High Performing Districts for each grade configuration in order to test for significant differences in mean scale scores and learning gains in reading and mathematics between schools of different grade span configurations.

### *Data Collection and Analysis*

The research design of the study was chosen to determine whether statistically significant differences in sixth grade mean student achievement scores and achievement gains in reading and mathematics existed between schools with sixth grade in differing grade configurations. These differences in means were examined for sixth grade school

mean scale scores, reported as a part of the 2009 Florida Comprehensive Assessment Test (FCAT) Reading and Mathematics results. The differences for the percentage of students achieving learning gains on 2009 FCAT Reading and Mathematics were based on figures reported on each school's 2009 School Grade grade level details report. The dependent variables, reported as interval data, were FCAT Reading mean scale score, FCAT Mathematics mean scale score, the percentage of students with learning gains on FCAT Reading, and the percentage of students with learning gains on FCAT Mathematics. The independent variable was school grade configuration.

In order to account for differences attributable other factors, the statistical test analysis of covariance (ANCOVA) was used. It was important to determine, as much as possible, that it was grade configuration that made a difference in mean scores, if indeed there was a difference, and not other factors. One factor commonly associated with and linked to the academic achievement of a school is the socioeconomic status (SES) of its students, often measured by the percentage of students participating in the National School Lunch Program (NSLP) receiving free or reduced priced meals. Using SES as a statistical control, ANCOVA was used to determine the relationship between student achievement and grade level configuration, accounting for or controlling for the socioeconomic status of the schools.

Because data for schools, not individual students, were used in the study, and because the data were available publicly, the study was exempted from review by the University of Central Florida (UCF) Institutional Review Board (IRB) under rules for research involving the collection of existing data. The IRB letter of exemption is provided in Appendix A.

## Summary

As instructional leaders seek to take student achievement to the next level, whether due to the increasing expectations of public accountability or a desire to create optimal educational opportunities for students, all possible avenues for that to occur are being explored. Decisions about which avenues to pursue should be based in fact and founded on research. This includes finding the most advantageous grade span configuration for middle level students, particularly sixth grade students. Although current grade span configurations exist for a variety of reasons, increasing the base of research on the topic is important to instructional leaders, civic leaders, and other decision-makers as they make instructional choices in the best interest of children.

## Organization of the Study

Chapter 1 is an introduction to the study: a statement of the problem, including the purpose of the study and the research questions and their related hypotheses, the delimitations and limitations of the study, a definition of key terms, the theoretical framework on which the study was based, and an overview of the methodology. Chapter 2 provides a review of literature and research related to the problem. Chapter 3 details the methodology that was used to conduct the study, including a review of the study questions and hypotheses, the research design with descriptions of the population, the sample, and data collection and analysis procedures, and a summary. Chapter 4 provides the results yielded by running the statistical tests on the data. Chapter 5 presents the findings of the study with an analysis of the statistical results and provides recommendations based on those findings.



## CHAPTER 2 REVIEW OF LITERATURE

Although there were more than 3700 studies related to middle schools published between 1991 and 2003 (Hough, 2003), many articles and studies themselves decried the paucity of research related to the impact of grade level configuration on student academic success. This review of literature presents an overview of the history of grade level configurations in the U.S. related to middle level students, a discussion of the current debate about grade configurations across America and how it may help meet the unique needs of adolescents, a summary of current grade span configurations and trends, and rationales for changing those configurations. It concludes with a review of research that attempts to ascertain whether the grade span configuration of a school impacts the achievement of its students, particularly those early adolescents typically attending elementary schools, K-8 schools, middle schools, and junior high schools.

### History

Policymakers and the public have always had an uneasy relationship with middle schools, just as they have had with young adolescents themselves. No one seems to know quite what to do with either one. No wonder then, that the history of middle schools has been a roller coaster of reform. (Beane & Lipka, 2006, p. 26)

Configurations for the middle grades have shifted several times over the last century for a variety of reasons. According to Juvonen, Le, Kaganoff, Augustine, and Constant (2004), the rationale for any one particular grade configuration for middle level students “often had more to do with labor market needs or the capacity of school buildings than with educational or developmental considerations” (p. xvi). Renchler (2000) expounds on this by noting “the exigencies of geographic location, student

populations, limited financial resources, and community preferences, among other factors, may often dictate the grade spans within a school system, hence the wide range of different grade configurations throughout the nation” (p. 1).

Throughout most of the 1800s, rural schools were typically one-room schoolhouses containing all grades levels while urban schools tended toward an 8-year primary (grades 1-8) and 4-year secondary (grades 9-12) model. At the turn of the 20<sup>th</sup> century, however, a new model began to emerge, one that moved upper grade students out of the primary school into a new secondary configuration (Cook, MacCoun, Muschkin, & Vigdor, 2008, p. 104; McEwin, 1983, p. 119). Juvonen et al. (2004) and McEwin (1983) enumerated the reasons for moving upper level students out of the primary schools. One was societal pressure to relieve overcrowding at 1-8 schools that came as a result of a rising tide of immigrants entering the U.S. who enrolled in urban primary schools. Another call for change came from industrialists who believed that an earlier secondary experience for students would help supply a more educated workforce of high school graduates to work in a proliferation of new American factories. Additional pressure came from university presidents, such as Harvard’s Charles Eliot, who called for more academic rigor earlier in the educational process, before ninth grade, to prepare more students for the demands of college and earlier entrance to college (Coleman & Roney, 2009, Middle School History).

Others pushing for change around the turn of the 20<sup>th</sup> century included the National Education Association (NEA) in 1899 and psychologist Stanley Hall in 1905 (Juvonen et al., 2004, p. 10). They advocated for change in grade configuration for upper elementary students to satisfy an emerging body of knowledge about the unique needs of

the adolescent. They promoted the advantages of a separate transitional period for students that would ease the move from the more sheltered elementary school to the more demanding environment of the high school and believed that the concept of a *junior* high school would address the issues of “the drop-out problem; the dawning recognition of individual differences; changing societal needs; and the desire to implement innovative educational reforms” (McEwin, 1983, p. 119).

These junior high schools, typically housing grades 7-8 or 7-9, proliferated rapidly between 1922 and 1938, becoming the dominant middle level configurations through the 1960s (Juvonen et al., p. 11).

Beginning in the 1940s, educational reformers began pushing for the creation of junior high schools. They argued that specialized schools for students in Grades 7-9 would better prepare young adolescents for high school by exposing them to a high school-like environment without the trauma of placing them in the same building as older teenagers. (Bedard & Do, 2005, p. 660)

During the 1960s, however, educators began to question the efficacy of junior high schools as miniature high schools, with their “emphasis on content rather than exploration, departmentalization rather than integration, and an adherence to rigid schedule” (Brough, 1995, p. 38). Junior high schools that had proliferated across the U.S. did not fit the increasingly popular view that young teens had unique social, psychological, intellectual, and emotional needs that required a different kind of education than that provided to high school students. This, coupled once again with burgeoning elementary enrollments and overcrowding as a result of the post-World War II baby boom, led to the idea of moving sixth grade students out of elementary schools into a new configuration, the 6-8 middle school (Juvonen et al., 2004, p. 12).

By the late 1960s, middle school supporters were similarly arguing that sixth grade students would benefit from being separated from elementary school children. They believed that the social, psychological, and academic needs of young adolescents are distinct from young children and older youth. Thus, placing young adolescents with high school students hinders social development, while placing them with elementary school students slows academic progress. (Bedard & Do, 2005, p. 660)

Middle schools began to proliferate and quickly became the dominant configuration between the elementary and high schools. According to figures from a 1989 study, “the number of U.S. 7-8 grade junior high schools decreased from 4,711 to 2,191 between 1970 and 1986, while the number of 6-8 grade middle schools increased from 1,662 to 4,329” (Juvonen et al., p. 12). “In the early 1970s, less than one-quarter of middle schools incorporated sixth grade; by 2000, three-quarters of all middle schools enrolled sixth grade students” (Cook et al., 2008, p. 104). “In 1986, 33 percent of sixth graders were enrolled in middle schools serving Grades 5 or 6 through 8; by 2001 this number had grown to 58 percent...A simple accounting of school configurations over time suggests that middle school advocates have won the battle” (Bedard & Do, 2005, p. 661).

In the 1980s, the middle school concept came into its own as a way to fully realize the potential of the new configuration. This was a philosophy that espoused meeting the unique needs of the whole adolescent child, often through constructs such as interdisciplinary teaming, advisory programs, and values education, with a focus on learning by exploring individual interests (Carnegie Council on Adolescent Development, 1989). In 1985, the National Association of Secondary School Principals (NASSP) published *An Agenda for Excellence at the Middle Level*. It supported the middle school concept by advocating for:

1. altering the culture and climate of the school to support excellence and achievement rather than intellectual conformity and mediocrity,
2. opportunities for students to achieve and excel in a number of domains, including the arts, athletics, academics, crafts,
3. creating a caring, supportive atmosphere that tolerates and welcomes a wide range of student diversity,
4. student advisement programs that assure each student regular, compassionate, and supportive counsel from a concerned adult,
5. sensitivity to the needs of the physical, intellectual, emotional, and social conditions of students,
6. opportunities for students to explore their aptitudes, interests, and special talents and to develop an accurate and positive self-concept,
7. a curriculum that balances skills for continued learning with content coverage which may be outdated before it is used, and
8. relating curriculum content to the immediate concerns of the young adolescent, assuring its utility outside the classroom. (p. 2-11)

Many 6-8 and 7-8 middle schools embraced the new middle school concept.

“Grade span reconfiguration was part of a new paradigm for middle grade education that moved away from the ‘bridging’ concept, toward focused consideration of the unique challenges faced by young teens” (Cook et al., 2008, p. 105). George (2001) called the middle school movement “one of the most substantial educational reorganizations that this nation has ever witnessed” (p. 40) and declared it to be “one of the most dynamic and successful educational innovations in the history of education” (p. 44).

A 1985 article in *The Christian Science Monitor* discussed the change to the 6-8 middle school:

Educators saw that children were reaching puberty earlier, so it made sense to provide a special education with focus on the pre-adolescent years at an earlier age. In addition, the junior high was seen by many as taking its name too seriously, providing a strong subject-matter emphasis for an

age group served better by a pupil-oriented emphasis and the close student-teacher contact more typical of the elementary school. (LaFranchi, 1985, p. B2)

Ten years later in 1995, Beyers of *The Washington Post* reviewed the four-year transition in the Washington area from junior high and intermediate schools to 6-8 middle schools. Describing the differences between the systems he said,

Under the old junior high system, students went to a school that operated like a high school, with teachers grouped by department. In a middle school, students are segregated by grade level and divided into teams, with each team served by a small group of teachers who specialize in various subjects but teach only children on their team. (p. B1)

The advantages of middle schools, according to Beyers, were that they “make the academic and social transition easier for sixth graders” and they “allow teachers to focus as a group on individual students and provide a more nurturing atmosphere” (Beyers, 1995, p. B1).

McEwin, Dickenson, and Jacobson (2004) summarized the winding road of middle level education:

The history of young adolescent education can be viewed as an ongoing search for the appropriate combination of school organization, curriculum, and instructional practices for young adolescents. While certain elements such as interdisciplinary teaming have emerged over the years as agreed-upon practices and have been widely implemented, other elements have yet to receive either full support or become common practice. (p. 1)

### The New Debate

Now, 25 years after the move to 6-8 middle schools and the revolution of the middle school concept, the appropriate grade span configuration for students in the middle has once again been called into question. A perusal of educational literature as

well as news media reports shows that middle school configuration is a topic that continues to be in the public and professional eye.

Little more than a decade after *The Washington Post* article praised the new middle school and touted its benefits, *The Boston Globe* opened a 2007 article on middle school reform with a quote from Robert Gaudet, a senior policy analyst at the Donahue Institute at the University of Massachusetts, who declared, “Middle schools are the great disaster of the education system” (Jonas, 2007, p. E1). Juvonen et al. (2004) related that middle schools have been called the Bermuda Triangle of education and have been blamed for increases in behavior problems, teen alienation, disengagement from school, and low achievement (p. xv). Tucker and Coddling (1998) of the National Center on Education and the Economy asserted that “middle schools are the wasteland of our primary and secondary landscape” (p. 153). In 1998, the Southern Regional Education Board (SREB) minced no words in titling their review of middle schools *Education’s Weak Link: Student Performance in the Middle Grades*, with the first words of page one declaring, “The middle grades – grades five through eight – are the weak link in American education” (Cooney, p. 1). Ten years and over 35 publications on improving middle schools later, SREB, in its latest publication, continued:

Many students entering the ninth grade are not prepared for the more demanding course work required of high school students — and they know it. On a 2006 survey of more than 11,000 ninth-graders at *High Schools That Work (HSTW)* schools, 39 percent of students said they were not prepared with the necessary reading skills for college preparatory high school courses. Additionally, 49 percent reported being unprepared in writing, 57 percent reported being unprepared in mathematics and 60 percent reported being unprepared in science. (Bottoms & Timberlake, 2008, p. 1)

Bad press and the poor reputation of U.S. middle schools today have raised doubts about whether middle schools serve young teens well. “Caught between the warmth of a good elementary school and the academic seriousness of a good high school, middle school students often get the least of both and the best of neither” (Tucker & Coddling, 1998, p. 153). Bradley (1998) declared middle schools to be “the muddle in the middle” (p. 38). Yecke (2006), the former Chancellor of K-12 Public Schools for the Florida Department of Education, called the problem of the middle schools “mayhem in the middle” and believed “abundant evidence indicates that the seeds that produce high school failure are sown in grades 5-8” (p. 20). She said, “In far too many cases, U.S. middle schools are where student academic achievement goes to die” (p. 20).

Some of the debate about the effectiveness of the middle school configuration has been fueled by the question of whether efforts to meet the social and emotional needs of adolescents has distracted schools from providing academic rigor and raising student achievement. Juvonen et al. (2004) make the point that:

One of the presumed key functions of middle schools, bridging, requires aligning the transitions both to and from middle school with the goals of elementary and high schools, respectively. Making these alignments is challenging because the problems associated with the transition from elementary are considered mainly social-emotional (for example, increasingly anonymous school environment, distant relationships with extrafamilial adults, and interruptions in peer networks), but the problems related with the transitions to high school are considered academic. (p. 17)

Yecke did not place the blame for the poor academic performance of America’s middle school students, as demonstrated on tests such as the National Assessment of Educational Progress (NAEP) and the Third International Mathematics and Science Study (TIMSS), squarely on the 6-8 grade level configuration alone. She placed it on implementation of the middle school concept and on what she saw as the sacrifice of



academic and intellectual pursuits in favor of a misguided emphasis on students getting “in touch with their political, social, and psychological selves” (p. 20). She said:

Too many educators view middle school as an environment in which little is expected of students, either academically or behaviorally, on the assumption that students must place self-discipline and high academic expectations on hold until the hormone-driven storms of early adolescence have passed. (p. 20)

Concerns about the quality and value of academic instruction in middle schools and low student achievement abound (Alt, Shoy, & Hammer, 2000; Bottoms & Timberlake, 2008; Brough, 1995; Cook, et al., 2008, Cooney, 1998; Cuban, 1992; Juvonen, et al., 2004; McParland, Balfanze, Jordon, & Legters, 1998; Pardini, 2002; Yecke, 2006). Former U.S. Secretary of Education Richard W. Riley, in his 1998 State of American Education speech, declared, “While we do a very good job at teaching math and science in the early years, we begin to drift in the middle years and fall behind the international standard of excellence” (Riley, 1998, para. 11). Poor test scores on national and international measures have frequently been given as evidence of failing middle schools.

The Trends in International Mathematics and Science Study (TIMSS) is often used to compare the performance of U.S. students to students around the world. The 1999 TIMSS-R, a follow-up to the original 1995 TIMSS that tested students in grades 4, 8, and 12, was administered only to students in grade 8. The fourth grade students in 1995 represented the same cohort of students tested in 1999, making some growth comparisons possible. One conclusion drawn from the comparison was that “the mathematics and science performance of the United States relative to this group of nations was lower for eighth-graders in 1999 than it was for fourth-graders 4 years earlier, in 1995” (National Center for Education Statistics (NCES), 2000). Juvonen et al.

(2004) also examined the math and science data of this same cohort of U.S. students and drew a general conclusion from the data that students in the U.S. started school with a competitive advantage compared to students worldwide, but lost it by grade 8 (p. 34).

Although this drop in performance was often explained by differences in which children and which schools are tested in other countries - differences centered on socio-economic status, ethnic diversity, and access to education as students get older – Juvonen et al. (2004), referring to the 1999 cohort comparison, stated that “these factors alone cannot account for the standing of U.S. students” (p. 34) when the drop in performance was compared from 4<sup>th</sup> to 8<sup>th</sup> grade within one cohort of students within one country.

The findings from TIMSS challenge us to view our educational system in a different way, challenge what we have taken for granted, and force us to reevaluate our cultural assumptions about educational excellence. While we give our students a good start, we must ask why students lose the lead as they are presented more complex mathematics and science content after grade four. In relation to middle grades education, the release of the TIMSS report provided the fuel to ignite dissatisfaction with America’s middle schools. (Anfara, 2005, p. 375)

No similar cohort comparisons were made, however, by TIMSS or the NCES for the students who took the TIMSS as fourth grade students in 2003 and then again as eighth grades students in 2007. Comparisons posted in the reports were same grade level to same grade level, across countries and across years (Gonzales, Williams, Jocelyn, Roey, Kastberg, & Brenwald, 2008). Given the TIMSS data provided, conclusions are difficult to draw for the cohort group. The FAQ section of the NCES/TIMSS website warned that scores from grade 4 cannot be directly compared to those from grade 8 because “the scaling of TIMSS data is conducted separately for each grade and each content domain...The subject matter and the level of difficulty of items necessarily differ between the assessments at both grades. Therefore, direct comparisons between scores

across grades should not be made” (National Center for Education Statistics (NCES), 2008, FAQ). Based on the results and analysis provided by TIMSS and NCES for the 2003 and 2007 groups, it is unclear whether Secretary of Education Riley’s conclusions hold up for the newer data. TIMSS scores for Mathematics and Science in grades four and eight, along with the international averages, are provided in Table 1.

Table 1  
Trends in International Mathematics and Science Scores 1995-2007

<b>Mathematics</b>	<b>1995</b>	<b>1999</b>	<b>2003</b>	<b>2007</b>
Grade 4	518	Not Assessed	518	529
U.S. Average				
Grade 4 Internat. Avg.	Not Available		495	500*
Grade 8	492	502	504	508
U.S. Average				
Grade 8 Internat. Avg.	Not Available	487	466	500*

<b>Science</b>	<b>1995</b>	<b>1999</b>	<b>2003</b>	<b>2007</b>
Grade 4	542	Not Assessed	536	539
U.S. Average				
Grade 4 Internat. Avg.	Not Available		489	500*
Grade 8	513	515	527	520
U.S. Average				
Grade 8 Internat. Avg.	Not Available	488	473	500*

\* Scale Avg.

The performance of U.S. 8<sup>th</sup> grade middle school students is also assessed nationally using the National Assessment of Educational Progress (NAEP). According to data provided by the National Center for Educational Statistics (NCES), average scale scores on NAEP in mathematics for 13 year olds (typically 8<sup>th</sup> grade students) have generally improved. Students in 2004 scored statistically significantly higher than all previous years in math, with an increase in average scale score from 266 points to 281 points. In reading, average scale scores had remained fairly flat since 1980, with a four point increase between 1971 and 2004, from 255 points to 259 points. Juvonen et al. (2004) concluded that “historical trends for students as a whole, as well as for particular subgroups, show a mixture of positive and negative results” (p. 38), especially when the data were disaggregated for ethnic and gender subgroups. Advocates for middle school reform have questioned whether slight but steady progress is enough progress over the course of thirty-five years of testing.

In 2005 the National Assessment of Educational Progress (NAEP) assessed American students in science. NAEP results reflected the TIMSS findings. Grade 4 results showed improvement over previous years, increasing the percentage of students performing at or above the Basic achievement level from 63% in 1996 to 68% in 2005, with 29% performing at or above the Proficient level. Grade 8 results were flat, showing no overall improvement. In 2005, 59% of the students in grade 8 scored at or above the Basic level, with 29% scoring at or above the Proficient level. In eighth grade reading, 73% of the students scored at the Basic level and 31% at the Proficient level. In eighth grade mathematics, 69% of the students scored at the Basic level and 30% at the Proficient level (National Assessment of Educational Progress, 2006).

The call for academic rigor in the middle school is not new. The Carnegie Counsel, in *Turning Points: Preparing American Youth for the 21<sup>st</sup> Century* (1989), included as one of the tenets of the middle school concept “teaching young adults to think critically,” advising that “every middle grade school should offer a core academic program and should expect every student to complete that program successfully” (1989, p. 42). The report went on to admonish:

Many middle grade schools in this country fail to support and challenge youth...Contrary to much conventional belief, cognitive development during early adolescence is not on hold. Belief in such claims has had substantial and damaging effects on middle grade education, by limiting innovation in curriculum development that might require new and more advanced ways of thinking. (p. 42)

Standards for high academic achievement have been a part of the middle school concept since its inception. They were outlined in *Turning Points* in 1989 and were reiterated in the National Middle School Association’s 2003 position paper, *This We Believe: Successful Schools for Young Adolescents*. The position paper declared, “Successful schools for young adolescents provide curriculum that is relevant, challenging, integrative, and exploratory” (National Middle School Association, 2003, p. 2). But the public perception of the success of the middle school belies nearly 25 years of effort.

Lounsbury (2009), an early leader in the middle school movement and long-time editor of the *Middle School Journal*, likened current criticism of middle schools to earlier criticism of junior high schools:

Like its predecessor, the middle school has come under heavy criticism. Because many students do not reach targeted academic goals, it has been labeled “the weak link in American education,” primarily by those who believe the middle school’s primary responsibility is to prepare students for advanced high school courses, and who presume that the school’s

concern for students as persons takes away from its academic responsibilities. The general public's perception, based largely on newspaper stories, that the middle school has been a failure is the result of the inability or unwillingness of critics to recognize the differences between the "middle school concept" and "the middle school" as it is commonly practiced. Because a school was newly labeled a middle school, observers assumed it was operating in ways that reflected the advocacy of its proponents, however, this was seldom the case. (p. 2)

Beane and Lipka (2006) concurred and wrote:

But therein lies the real problem with the middle school concept: On the whole, its components have not been well implemented over time and rarely as a complete set of principles and practices. Most often, the title of 'middle school' has had less to do with implementing the concept and more to do with changing the name on the front of the building. (p. 28)

George (2001), writing about the state of the middle school movement in Florida after 30 years of implementation, noted, "So much has changed in Florida's middle schools during the last three decades, yet the challenges remain relatively constant" (p. 44). In order for middle schools to succeed and to ensure a quality educational experience for students, George says that current middle school educators must ask themselves and be able to answer the following questions:

1. Can we build and operate schools that feel small regardless of their size?
2. Can we find opportunities to create curriculum experiences that match adolescents' needs?
3. Can we find a new generation of effective [middle level] educators? (p. 44)

### Adolescence as a Turning Point

Even with the demand for increased academic rigor, the research on the unique needs of middle level students continues to drive educational decisions made on their behalf. Much has been written about the challenges students face as young teens. Early adolescence is often acknowledged as a time of upheaval and risk- a time of emotional,

social, physical, and intellectual change. “The notion that early adolescents have social, psychological, and academic needs that are distinct from those of older and younger students has long been recognized” (Alt, Choy, & Hammer, 2000, p. 2). Former Secretary of Education Richard Riley, called middle schools “a turning point in the growth of a child” and admonished that we must put “a new focus on the importance of children in the middle” (Riley, 1998, Middle Schools).

Pearl (2006) studied the relationship between what she called the risk-status of students during the first year of middle school and outcome experiences (grade point averages, passing core classes, suspensions, absences, discipline referrals, retentions, etc.) across all three years of middle school. She said:

Research suggests that...the first year of middle school is the pivotal year in determining an adolescent’s middle school trajectory. Many students who successfully negotiated elementary school find the structure and schedule of middle schools overwhelming. These students often experience declines in motivation, academic performance, self-esteem, and behavior during [the first year of middle school.]...The transition to middle school also often coincides with the onset or experience of puberty and a psychological distancing from parents and gravitation toward peers. Many adolescents find themselves struggling to meet the increased demands of the middle school environment at the same time their support network declines. (p. 36)

Although many students experience success in middle school, many struggle. The middle grades often represent a time of academic difficulty for students, even for students who had experienced academic success in elementary school. “Although elementary and high schools are often faulted for similar deficits in academic rigor and depth, test data highlight the middle grades as the point when average student achievement begins to lag” (Alt, Choy & Hammer, 2000, p. 3). National as well as international data, like NAEP and TIMSS, are often referenced to demonstrate this lag in

achievement. Bateman (1995) captured the importance of the middle grades in preparing students for future school success:

Middle school is...a floundering ground. The cognitive, psychosocial, and physical changes that take place during early teen years places these young people at a greater chance for being at-risk than at any other time. If educators don't focus on middle school as a prime target for programs dealing with self-esteem and academic achievement of at-risk youth, then these young people could become the dropouts of tomorrow. (p. 28)

Caught at the leading edge of the middle school configuration debate are students entering sixth grade. The issue for many school districts is whether sixth grade students should be at the top of the pecking order in an elementary school, or at the bottom in a middle school. Each offers a very different experience.

In an elementary school, sixth grade students often spend the majority of their day in one teacher's classroom, with the same group of students, in what is sometimes considered to be a more nurturing environment (Cook et al., 2008, p. 4). If the curriculum is delivered using a departmentalized approach, students typically maintain strong links to a homeroom teacher. Students usually participate in non-academic classes such as music, art, and physical education as a part of a regular rotation of activities.

Bedard and Do (2003) considered placement of sixth grade students in an elementary or middle school environment a "change in structure [that] has several potentially important implications" (p. 664).

Middle schools move eleven-year olds out of relatively small elementary schools where they are the oldest students in the school, and spend most of their day with the same group of students and one teacher, to a substantially larger institution where they are the youngest students in the school and have many different teachers during the course of each school day...Sixth graders are now more likely to be instructed by 'experts' with more training in specific subjects – which likely has a positive impact. Second, monitoring is more difficult given the larger student body and the



fact that each teacher instructs several different groups of students each day – which likely has a negative impact. (Bedard & Do, p. 664)

In a middle school, students usually move from teacher to teacher throughout the day, perhaps being associated with a team of core teachers, often with different students in each class. Teachers are often subject area experts, who, according to Yecke (2006), are more likely to produce higher academic achievement. This is critical, she said, because “a truly compassionate education cannot allow the desire for a nurturing environment to trump access to a rigorous, well-taught curriculum” (p. 24).

Although some subject area integration may occur, each teacher is focused on a particular academic pursuit, often in isolation of other coursework. Students may begin to take specialization electives, such as band, art, or technology, or may participate in exploratory courses. While “elementary school teachers use instructional practices that emphasize task goals...middle school teachers and students perceive the school culture as more performance-focused” (Midgley, Anderman, & Hicks, 1995, p. 90). Each has its appeals and drawbacks.

School characteristics that are typically different in elementary and middle schools, including school and class size, rate of substance abuse, instances of bullying, number of fights, level of parental involvement, and peer influence can impact the success of students. Cook et al. (2008) suggested that

Perhaps the most important difference is that a sixth grader in elementary school is among the oldest in the school; a sixth grader in middle school is among the youngest, with daily exposure to older adolescents. In terms of both the developmental changes experienced by early adolescents, and the social and academic challenges that they face in the middle school environment, the influence of the peer group on behavior is particularly important. (p. 106)

They concluded their research with the statement that “exposing sixth graders to older peers has persistent negative consequences on their academic trajectories” (p. 106).

Juvonen et al. (2004) examined data on the impact of peers collected for the 1998 World Health Organization’s Health Behavior in School-aged Children (HBSC) study for American 11.5 to 14.5 year old students, ages typical of middle school students. When analyzing the data regarding peer culture, they noted:

Students in the United States report having less positive peer culture at school than do students in other nations, except for the Czech Republic. That is, the U.S. students report that their schoolmates are not kind, helpful, and accepting and do not enjoy one another’s company. (p. 56)

Whitley, Lupar, and Beran (2007) based their study of the relationship between grade span configuration and academic achievement for adolescents on a theoretical framework centered on the differences between elementary and middle or junior high schools. The foundation for their theoretical framework was Eccles’ (1999) stage-environment fit theory, which posited that “there are substantial declines in academic motivation and achievement across the upper elementary and early secondary school years” (para. 1) that may be attributable to students’ lack of developmental readiness to make school transitions, particularly for at-risk students, including those from low socioeconomic backgrounds. Eccles cited one of her previous collaborative works (Eccles & Midgley, 1989) to explain her adaptation of Hunt’s Person-Environment Fit theory into what she termed the Stage-Environment Fit theory:

Eccles and Midgley (1989) proposed that these negative motivational changes result from the fact that traditional junior high schools do not provide developmentally appropriate educational environments for early adolescents. They suggested that different types of educational environments may be needed for different age groups in order to meet individual developmental needs and foster continued developmental growth. Exposure to the developmentally appropriate environment would

facilitate both motivation and continued growth; in contrast, exposure to developmentally inappropriate environments, especially developmentally regressive environments, should create a particularly poor person-environment fit, leading to declines in motivation as well as detachment from the goals of the institution. (para. 2)

Whitley, Lupar, and Beran (2007) used Eccles' theory to link the environmental differences between elementary schools and middle or junior high schools and potential student success in different grade span configurations based on their developmental readiness. They theorized that the Stage-Environment Fit theory could explain why environmental differences between elementary and middle schools could define student success based on their developmental readiness to cope with transitional changes. The environmental differences between elementary and secondary schools include (a) one teacher versus many teachers, (b) strong relationships with one teacher and a small group of students versus more difficult to establish relationships with multiple teachers and many more students, (c) more individualized instruction versus whole group instruction, and (c) emphasis on whole-child growth versus academics and discipline. If a student is not ready for the traditional structure of the secondary configuration, "these types of changes are detrimental to the needs of students and can result in declines in motivation and subsequently achievement" (Whitley, et al., p. 652).

The middle school concept was conceived in part to address these issues by advocating the creation of a school culture that would meet the unique social, emotional, intellectual, and developmental needs of the adolescent. From the advent of the middle school concept, creating a supportive school culture that supports adolescent development and achievement has been a critical component. In *An Agenda for Excellence at the Middle Level* (1985), the National Association of Secondary Principals

listed culture and climate elements of middle level education that must receive the highest priority. “Specific attention must be given to the alteration of the culture and climate of the school so that it supports excellence and achievement rather than intellectual conformity and mediocrity” (p. 3). Nearly 20 years later, the National Middle School Association’s *This We Believe: Successful Schools for Young Adolescents* position paper advocated for schools in which students are “engaged in learning that is relevant, challenging, integrative, and exploratory” and in which they can “thrive academically, socially, and emotionally in a democratic learning environment where trust and respect are paramount” (2003, p. 2).

In spite of criticism that the middle school concept has eroded academic progress, student achievement and support for the whole child as advocated through the middle school concept are not mutually exclusive. Juvonen et al. (2004) advocated for “a balance between support and academic rigor” (p. 18). They cited the 1999 research of Lee and Smith who studied students in grades 6 through 8 in 304 Chicago schools to determine the effects of the support of teachers, parents, peers, and neighborhoods on academic achievement. They found that “students who felt supported and were in schools that emphasized academic rigor showed the largest gains in achievement in sixth and eighth grades” (p. 18).

The goals of academic excellence and a supportive climate can and do coexist in successful schools. This research considers the extent to which school grade configuration connects a supportive school climate to an impact on academic success.

## School Grade Span Configurations

This study focused on the impact of school grade span configuration on the academic success of sixth grade students. These students were currently housed in a wide variety of configurations.

According to data from the National Center for Educational Statistics (NCES) (2006), in the 2005-2006 school year there were 33, 942 public schools in the U.S. that included sixth grade students. Those 33, 942 schools served sixth grade students in one of 47 different configurations. Table 2 shows that these configurations ranged from a pair of 2-11 schools to 12,327 Prekindergarten/Kindergarten (PK) - 6 schools.

**Table 2**  
The Number of U.S. Schools that Included Grade 6 in All Grade Span Configurations During the 2005-2006 School Year (NCES, 2006)

Span	#	Span	#	Span	#	Span	#	Span	#	Span	#	Span	#
PK-6	12,327	PK-7	429	PK-8	5,348	PK-9	180	PK-10	51	PK-11	35	PK-12	1,420
1-6	157	1-7	15	1-8	92	1-9	6	1-10	3	1-11	4	1-12	39
2-6	58	2-7	5	2-8	13	2-9	4	2-10	0	2-11	2	2-12	25
3-6	229	3-7	10	3-8	61	3-9	4	3-10	2	3-11	3	3-12	19
4-6	508	4-7	29	4-8	239	4-9	5	4-10	0	4-11	4	4-12	33
5-6	509	5-7	93	5-8	1,482	5-9	43	5-10	13	5-11	5	5-12	77
6	110	6-7	145	6-8	9,199	6-9	209	6-10	67	6-11	34	6-12	597

Using the NCES data, Table 3 summarizes the number of schools at each grade span and shows the change in number and percentage of those configurations since the last NCES report in 2000. Although the number of schools serving students in sixth grade increased by 868, a 2.6% increase, the number of traditional PK-6 schools

decreased by 1394 schools, slightly more than a 10% drop. All of the other most popular grade configurations, including 6-8, PK-8, 5-8, and PK-12 increased in number, with the PK-8 grade span showing the greatest rate of change, nearly an 18% rate of increase since 2000. Figure 1 graphically shows the 2000 to 2006 comparison of the percentage of students in grade configurations that include sixth grade.

Table 3  
Number and Percentage of U.S. Schools in Grade Configurations with Grade 6: 2000-2006

	2000 number	2000 percent	2006 number	2006 percent	Number change	Percent change	Rate of change
PK-6	13721	41.49%	12,327	36.32%	-1,394	-5.17%	-10.16%
6-8	8381	25.34%	9,199	27.10%	818	1.76%	9.76%
PK-8	4551	13.76%	5,348	15.76%	797	2.00%	17.51%
5-8	1363	4.12%	1,482	4.37%	119	0.25%	8.73%
PK-12	1319	3.99%	1,420	4.18%	101	0.20%	7.66%
Other	3739	11.30%	4,166	12.27%	427	0.97%	11.42%
Total	33074		33942		868		2.6%

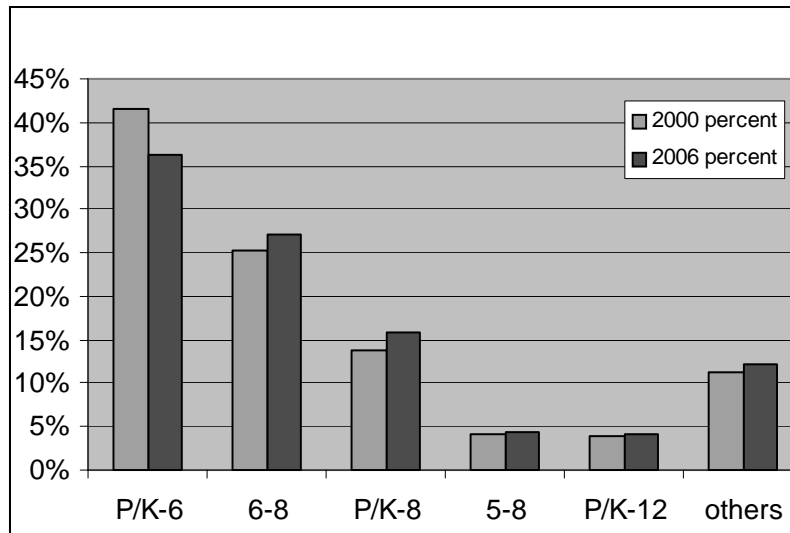


Figure 1 Percentage of U.S. students in grade configurations that include grade 6

Nationally, the data show that the most popular configurations for sixth grade continued to be PK-6 and 6-8. Although the number of PK-6 schools has declined, the number of 6-8 middle schools continued to grow, rising by nearly 10% between 2000 and 2006. This growth occurred despite increasing criticism of the 6-8 middle school. McEwin, Dickinson, and Jenkins (2003), summarizing grade organization trends for the National Middle School Association, concluded:

The vast majority of the school districts in the nation continue to organize schools into the three-tier organizational plan. The most common district organizational plan is grades K-5, 6-8, 9-12. This plan, along with the K-4, 5-8, and 9-12 plan, receives wide support from those responsible for the education of young adolescents. Significant decreases in the numbers of grades 7-9 junior high schools as well as less dramatic decreases in grades 7-8 middle school and the grades K-8 elementary school have occurred. The premise that young adolescents need and deserve a school devoted exclusively to their education and welfare is widely accepted by educators, policy makers, parents, and other stakeholders across the nation. (p. 2)

Juvonen et al. (2004), however, summarized the findings of several studies on the 6-8 middle school by saying, “The scientific rationale for creating separate schools for young adolescents [is] weak” (p. 113). They went on to say:

Middle schools have become the norm more because of social and demographic pressures than because of scientific evidence supporting the need for a separate school for young teens. Not only is evidence showing that young teens benefit from a separate three years of schooling weak, there is strong evidence suggesting that transitions (especially if they involve several changes in the school environment and instruction) have at least temporarily negative effects on some youth. Separate elementary schools and middle schools cause transition problems for students that can negatively affect their developmental and academic progress. In short, the research findings indicate that the separate middle school has weak empirical support. (p. 113)

The debate continues.

## Considering Grade Span Options

Although 6-8 middle schools continue to grow in number, they are growing at about half the rate as K-8 schools. There appears to be a rising interest in the K-8 configuration throughout the country. Many districts are side-stepping the entire issue of whether sixth grade should be the last year of a K-6 grade span or the first year of a 6-8 span by considering a K-8 configuration.

Pardini (2002) reported on school districts throughout the United States who, for a variety of reasons had adopted the K-8 model, usually replacing a K-5, 6-8 configuration. Districts included those in Cleveland, Cincinnati, Baltimore, Oklahoma City, Boston, Philadelphia, and Fayetteville, Tennessee. Reasons given for making the change were usually related to dissatisfaction (on the part of educational leaders, parents, or the community) with indicators of student success in the middle schools, including academic achievement, absenteeism, discipline referrals, and suspension rates. In every school system Pardini reviewed, district officials reported that since moving to a K-8 configuration, there had been an increase in student achievement, improved attendance, and a decline in discipline problems for middle level students. One superintendent, however, acknowledged that “other variables prevent her from attributing all the student gains to the K-8 model” (Pardini, *A Trend Begins*, para. 3). Claims for success were anecdotal and Pardini did not provide actual data for the districts.

Jonas (2007) reported that Boston created a 17-member Middle Grades Task Force to find a grade configuration that would improve student achievement, focusing on a model that minimizes student transitions from level to level. The task force considered a K-8 model that was being explored or implemented in other large districts in



Philadelphia, Cleveland, and Pittsburg. It was also studying a 7-12 grade configuration. Its appeal was based on an assumption that a “rigorous six-or seven-year curriculum, within a single school extending through 12<sup>th</sup> grade, offered the best hope for student success in K-12 education, and beyond, especially among students from lower-income families, where a college future was not nearly the presumed path that it was in middle-class homes” (Jonas, p. E1).

*The New York Times* ran a three part series in 2007 entitled “Taking the Middle Schoolers Out of the Middle” (Gootman, p. 1). It presented the pros and cons of a variety of middle grade configurations being considered in several northeastern metropolitan areas, including New York and Philadelphia. The series acknowledged a dramatic increase in the number of K-8 schools that were replacing traditional 6-8 schools, and reported that districts were considering schools with a 6-12 configuration as a way to increase the time spent with students in an academically focused secondary setting to make them college-ready.

At the beginning of the 2008-2009 school year, some Los Angeles sixth grade students who had attended K-5 schools the previous year found themselves back at their elementary schools as sixth grade was removed from the 6-8 middle schools. Landsberg reported in *The Los Angeles Times* on September 2, 2008 that “School districts nationwide are taking a hard look at middle schools, acknowledging that they have become the weakest link in the educational system” (p. B1). He averred that the changes were being made despite the fact that “research is sketchy on the benefits of K-8 schools” and quoted Al Summers, director of professional development for the National Middle

School Association, “There’s no body of research at the present time that says what type of configuration delivers the best results” (p. B1).

### Research on Grade Span Configuration

With school systems considering changes to their grade span configurations for middle level students, research could, and ostensibly should, be guiding their decisions. But researchers, journal articles, research reviews, and studies often reference the lack of or limited research on the topic of grade span configuration, especially as it relates to academic achievement (Coladarci & Hancock, 2002; Hough, 2005; Klump, 2006; Paglin & Fager, 1997; Pardini, 2002; Reeves, 2005; Renschler, 2000; Wihry, Coladarci, & Meadow, 1992). Renschler (2000), research analyst for the ERIC Clearinghouse on Educational Management, began his review of grade configuration research by noting, “Despite the likelihood that grade span, or grade configuration, has a significant influence on the success of school systems and the students they serve, empirical research on the topic in the last decade has been very sparse” (p. 2). “Research on the effectiveness of grade-level configuration is sketchy” (Reeves, 2005, p. 2). Paglin and Fager (1997) expounded on the problem: “Very little research attempts the more difficult task of determining if a cause-and-effect relationship exists between grade configuration and academic achievement, while controlling for other factors such as school size, student socioeconomic status, teacher experience, and so on” (p. 6). Hough (2005) lamented,

While scholars have compiled a plethora of information about middle level education, researchers have shied away from the number 1 middle-level question asked by policymakers, that is the relationship between grade-span configuration and student outcomes, including but not limited to academic achievement. (Evidence Lacking section, para. 8)

Klump (2006), writing for the Northwest Regional Educational Laboratory (NRWEL), noted that their previous 1997 review of research on grade configuration concluded that “little evidence existed to determine a cause-and-effect relationship between grade configuration and academic achievement” (para. 4). Of her more recent look at the research for NRWEL, Klump said, “Not much has changed during the last decade in terms of the limited amount of rigorous research, although a few more studies have been conducted. Still, no empirical, large-scale studies have examined the relationship between grade configuration and student achievement as measured by standardized test scores” (para. 5).

Coladarci and Hancock (2002) remark that the few studies that have been undertaken, particularly descriptive studies,

are not designed to suggest the causal effects of something (like grade span). More technical methods are required, such as statistical procedures that attempt to take into account, or control for, important confounding factors. However, only a few grade-span researchers have employed such methods. (p. 1)

Klump (2006) reinforced this idea. “Of the studies that exist, only a few have statistically controlled variables: Most are case or correlational studies and rely on data self-reported by school districts. Few have looked at the relationship between grade configuration and student outcomes” (para. 6). But studies do exist, including several dissertations, which have taken a statistical approach to the question of whether or not grade span configuration impacts student achievement.

Wihry, Coladari, and Meadow’s 1992 study is generally regarded as one of the first empirical studies on the effect of grade span configuration on academic achievement and is widely quoted in subsequent research as providing the definition of grade span, “the range of grades making up a school” ( p. 58). Their research focused on the impact

of grade span configuration on the achievement of rural eighth grade students in Maine, using the Maine Educational Assessment (MEA) – the state’s annually administered standardized assessment. In addition, the researchers “recognized that the quantitative assessment of grade span effects is best done in a multivariate context” (p. 58) in which “researchers attempt to control for confounding influences on both grade span and academic achievement (e.g., community socioeconomic status)” (p. 59). Wihry et al. used socioeconomic status (SES) of the community as measured by the proportion of the community that completed at least four years of college, per-pupil instructional expenditures, school size, pupil-staff ratio, post-baccalaureate teacher education, and teacher experience as the controlling variables in the study. They determined, as expected, that SES had a major effect on MEA scores, finding that “test scores increased almost 5 points for every one-point increment in the percentage of community members who had completed four or more years of college” (p. 64). Teacher experience was also “a significant predictor of student performance” (p. 64), yielding nearly a four-point increase for every year of teacher experience. The other controlling variables were not found to significantly impact reading or mathematics achievement. Having controlled for factors which “render[s] problematic any attribution of effects to the grade span variable itself” (p. 59), Wihry et al. found that “grade span...emerged as a significant predictor of academic achievement” (p. 64). Coladarci and Hancock (2002) summarized the results:

Wihry et al. found that eighth-grade total achievement was significantly higher in K-8, K-9, and 3-8 schools than in schools configured around the middle grades (4-8, 5-8, 6-8) or those having a junior/senior high school configuration (6-12, 7-12, 8-12). (p. 2)

A few years earlier, Becker (1987) had also studied the impact of organizational patterns of schools on sixth grade student achievement through the lens of the

socioeconomic status (SES) of the student for the Center for Research on Elementary and Middle Schools through Johns Hopkins University. Using a sample of approximately 8000 students in 330 schools in Pennsylvania, he examined the effect of grade span configuration (as well as instructional specialization/departmentalization and ability grouping) on the academic achievement of students. He used a ‘background index’ which included SES, race, and “residential instability” (p. 8) as a control element that roughly corresponded to a measure of affluence. Unlike other research that simply evaluated achievement outcomes based on grade configuration, or that simply controlled for SES, Becker’s study evaluated the effect of the grade configuration on groups of students based on their SES background index. He found that

For all five achievement tests, ‘low’ background sixth grade students in elementary school settings score much better than ‘low’ background sixth grade students in middle school settings. ‘Low-middle’ students also do better [in elementary settings] but the differential is only half as great as for the ‘lows.’ ‘High-middle students do consistently very slightly better in elementary school settings. And ‘high’ background students do consistently better in NON-elementary settings...The advantages of the elementary school setting for ‘low’ background students are clearest for reading and mathematics...In contrast, ‘high’ background students score somewhat better in middle school settings on all five [academically assessed] tests, but no one subject gives them a substantial advantage in middle schools. (p. 17)

Becker found that the grade span effect was dependent on the background index (or affluence level) of the student. Generally, sixth grade students in elementary settings academically outperformed those in middle schools, but the advantage declined and eventually disappeared as the background index increased, to the point that sixth grade students with the highest background index (most affluence) did better in the middle school when performance on all tests was considered. This occurred even when

controlling for “instructional practice, tracking, ability grouping, and enrollment per grade” (Coladarci & Hancock, 2002, p. 2).

Like Wihry et al. (1992), who studied rural schools in Maine, Franklin and Glascock (1996) studied rural schools in Louisiana. They focused on the effect of grade span configuration on student performance as defined by academic achievement on several different state and national tests and by student persistence in grades six through twelve. Student persistence was defined as “those activities that indicate the holding power of a school... attendance, suspensions, expulsions, and dropouts” (p. 10). They controlled for school size and socioeconomic status. Franklin and Glascock found that students in grades six and seven in elementary configurations (K-6, K-7, and K-12) showed significantly higher achievement results on three separate academic assessments in reading and mathematics than students in middle or junior high schools (6-8 and 7-9). They also showed “elementary and combination schools to have lower incidences of suspensions and expulsions and higher student attendance” (p. 20). They concluded:

It appears that elementary and combination school learning environments are more beneficial to students than either the middle or secondary school learning environments. This is true both for academic performance as well as for student persistence...Combination schools performed as well as elementary schools and in some cases better (e.g., high poverty). (p. 21)

Hough (1989) began his research on grade span configurations with middle schools in California. In his initial research, he determined that “the question as to which is the ‘best’ organizational structure cannot be answered...since none of the research evidence collected to date provides compelling scientific evidence that any particular grade span significantly improves student learning or social adjustment” (p. 38). He concluded that “any number of grade organization patterns have proven successful” (p.

iv), although “structures grounded in elementary philosophies may meet the needs of young adolescent learners better than those patterned after secondary organizational structures” (Hough, 1995, p. 7).

With those findings in mind, Hough (1995) promoted a concept he called the elemiddle school. Given his broader findings of success at different grade configurations, Hough proposed the elemiddle school as one that is consistent with “the current trend toward aligning middle schools more closely with elementary programs” (Hough, 1995, p. 8). Commenting on Hough’s work, Renchler (2000) says “(Hough) believes that the philosophies of elementary school education contained within the elemiddle school may well serve the needs of young adolescents better than the newer middle school structure (grades 6-9) or the traditional junior high structure (grades 7 and 8 or grades 7-9)” (p. 3). “Elemiddle schools, which include both primary and middle grades, may more easily facilitate the child-oriented programs conducive to young adolescent learning” (Hough, 1995, p. 9). He proposed that the elemiddle school provide an organizational structure

that attends to the needs of young adolescents, aged 10-14, in any combination of grades 5 through 8, but is also part of an organizational structure that includes lower grades. Elemiddles are housed in K-8 schools (56%), in 4-8 and 5-8 schools (23%), or pre-K-8 schools (16%). (1995, p. 7)

Just as every school labeled as a middle school does not apply the middle school concept, Hough makes the point that not every school configured as an elemiddle school practices the elemiddle concept (Hough, 2005, para. 1). He recommended that future research on grade-span configuration take into consideration the degree to which the elemiddle concept, or the middle school concept, is being implemented at schools in order to make an accurate determination as to the attribution of the success of the school

being a function of its configuration. This supports the conclusion of the National Middle School Association (2006) that “middle level education is not about grade configuration, but rather about effective programs and practices, like interdisciplinary teaming and integrated curriculum, that are developmentally appropriate for young adolescents” (p. 1).

Cook, MacCoun, Muschkin, and Vigdor (2008) introduced their study of grade configuration by noting, “What has been for the most part lacking in this debate...is direct evidence concerning what difference the grade configuration is likely to make for students” (p. 105). They studied the impact of grade configuration on sixth grade public school students in North Carolina, focusing on differences in the behavior and the reading and mathematics achievement (as measured by statewide end-of-grade test scores) of sixth grade students in K-6 schools compared to 6-8 schools. They controlled for socioeconomic and demographic factors related to the schools and the students.

The findings of their research indicated that, compared to sixth grade students in an elementary configuration (K-6), sixth grade students in a middle school configuration (6-8) (a) were twice as likely to be cited for discipline infractions, (b) were more likely to continue to exhibit a higher rate of discipline infractions through ninth grade, and (c) had lower scores in reading and mathematics. They concluded that “placing sixth grade in middle school increases behavior problems and reduces academic performance, both in sixth grade and subsequently” (p. 118). These findings of Cook et al. support research from Bedard and Do (2005) which found that districts that have moved sixth grade students from a K-6 elementary to a 6-8 middle school configuration often experience a decline in on-time graduation rates (p. 681).



Cook et al. also reported that “the results suggest that exposing sixth graders to older peers has persistent negative consequences on their academic trajectories” (p. 106). They note, however, a limitation to their study. Although their research supports placement of sixth grade students into K-6 elementary schools rather than 6-8 middle schools, it does not address issues related to the K-8 configuration, which exposes younger children to the same negative peer influences of older adolescents. They suggest further research in this area.

Like Cook et al., Collins (2006) also studied sixth grade achievement scores for North Carolina schools. He focused on the difference in the mean reading and mathematics achievement scores for sixth grade students in 6-8 middle schools compared to K-8 schools. He used North Carolina End-of-Grade Test mean school scores for 60 schools over three years for all students and for four subgroups: black, white, male, and female. From his research, Collins concluded that students in K-8 schools had “higher academic achievement levels than their counterparts attending sixth through eighth grade configured schools” (p. 110) and that “sixth grade students who make a transitions to middle schools score lower on academic testing for at least a year after the transition to the new school environment” (p. 114). Students in 6-8 middle schools who made a transition at the sixth grade level showed statistically significantly lower mean reading scores and mathematics scores than students who remained in a K-8 school. Differences in the mean scale scores for subgroups did not consistently show statistical significance for any subgroup over time. For two of the three years, the data showed no statistically significant difference for any of the subgroups based on the configuration of the school they attended.

Vaccaro (2000) studied whether there was a difference in student academic gains in reading, mathematics, and science based on enrollment in 6-8 middle schools or K-8 schools. He compared the assessment results of 57 middle schools to 62 K-8 schools in the East Tennessee Region over a three year span. Academic gains were determined using the Tennessee Value-Added Assessment System, a system that measures “the impact (effect) of different factors on student achievement (learning) across time” (Vaccaro, p. 3) and that adjusts scores by correcting for external variables such as student mobility and socioeconomic status. Based on his results, Vaccaro concluded:

1. Regarding average academic gains,
  - a. Sixth grade students performed better in K-8 schools
  - b. Seventh grade students performed better in middle schools, and
  - c. Eighth grade students performed about the same in both K-8 schools and middle schools. (p. 67)
2. Regarding achievement of USA Norm Gains achievement,
  - a. Sixth grade in K-8 schools met a higher percentage of USA Norm Gains than sixth grade in middle schools, and
  - b. Seventh and eighth grade in middle schools met a higher percentage of USA Norm Gains than seventh and eighth grade in K-8 schools. (p. 70)

Vaccaro found that a K-8 grade span configuration was more appropriate than a 6-8 structure for both sixth and seventh grades with regard to academic achievement. He found a large effect size favoring the K-8 configuration for sixth grade reading gain scores over all three years of the study, and found moderate effect sizes favoring the K-8 configuration for sixth grade math, language, and science gain scores (p. 72).

Dove (2007) also sought to establish a relationship between the academic achievement of sixth grade students and the grade span configuration of the school they attended. She used results from the Arkansas Benchmark Examination for mathematics and literacy over a three year period for 281 schools. Grade configurations for this study

were grouped according to the year of the transition to sixth grade: schools in group 1 all ended with sixth grade (P-6, K-6, and 1-6), schools in group 2 all began with sixth grade (6, 6-7, and 6-8), and schools in group 3 all had sixth grade students in their second year (5-6, 5-7, and 5-8). Unlike most of the studies in similar studies, Dove concluded “the results of the study indicated there was not a statistically significant difference in the relationship between grade span configuration and mathematics and literacy scores over the three years examined” (p. 85). She said, “The results of the study suggest that grade span configuration alone does not account for sixth grade students’ academic achievement as measured by the Arkansas Benchmark Examination” (p. 86). She also said “the results are consistent with findings by Johnson (2002) in a study of rural students in South Dakota” (p. 86).

Johnson’s 2002 study focused on student achievement in mathematics and reading as measured by SAT 9 scores and report card grades over multiple years after a transition from an elementary setting to a middle school setting: from fourth grade to fifth grade for some students, and from fifth grade to sixth grade for others. Although Dove referenced Johnson to support her findings of no significant differences in mean achievement between schools with the different configurations, Johnson (2002) actually reported mixed results. She concluded,

From the data analysis in this investigation, it would appear that there are some differences in achievement based on the transition of going from an elementary school to a middle school or transitioning in either the fifth or sixth grade. The area that appears to have the most significant differences is that of reading...However, the achievement levels recovered in the years following the transition as students became accustomed to their new environment... (p. 92)

In her dissertation, Edds (2006) examined the relationship between grade span configuration and sixth grade student achievement in language arts and mathematics in California, with a special focus on high poverty schools in rural areas. In addition to standardized test scores, she studied the effect of grade span on what she called “persistence measures – attendance, suspension/expulsion, and drop-out rates” (p. vii). She used a small sample of five schools each, in K-6, K-8, and 6-8 configurations. From her research, Edds concluded that students in K-8 schools “had higher student achievement and lower suspension rates than sixth grade students attending K-6 and 6-8 schools. The data also indicated sixth grade students attending 6-8 schools had lower student achievement than either K-8 or K-6 schools. The findings from this study suggest grade configuration does have an impact on both student achievement and student persistence” (p.vii).

Tucker and Andrada (1997) researched student achievement based on the grade span of the school on behalf of the Connecticut State Department of Education. Their study was unique in that it assessed the link between the academic achievement of sixth grade students and grade span configuration in light of whether the school, dependent upon its grade configuration, was held accountable for student results. At the time of the study, schools were only accountable for student results in grades 4, 6, and 8. For K-5 schools, there was no accountability beyond grade 4. K-6 and K-8 schools, however, were accountable for sixth grade performance. Controlling for the performance of fourth grade, the researchers found that sixth grade students performed better in K-8 schools that were accountable for their results. Commenting on this study, Renchler (2000) noted “this study demonstrates the subtle ways in which grade span can work for or against

students learning within a particular school system” and that “school-level policies and practices can vary dramatically depending on the grade span used within a school” (p. 3).

Alspaugh’s research on grade span configuration and student achievement led him to focus on the impact of the transitions students make as they travel through the K-12 educational system. Renchler (2000), reflecting on Alspaugh’s research, noted, “In general, he has found that students suffer achievement loss during each transition year they experience (from elementary school to middle or junior high school, and from middle or junior high school to high school” (p. 4). Alspaugh purported that transitions between schools create academic, social, and personal problems for students as they attempt to make each adjustment (1999). Alspaugh (1998) studied the achievement loss of students who transferred from different elementary configurations to different middle school configurations. He found that “students placed in relatively small cohort groups for long spans of time tend to experience more desirable outcomes” (p. 25). He wrote:

A statistically significant achievement loss associated with the transition from elementary school to middle school at sixth grade was found, as compared with K-8 schools that did not have a school-to-school transition at sixth grade. The transition loss in achievement was larger when students from multiple elementary schools were merged into a single middle school during the transitions. The students from the middle schools and K-8 elementary schools experienced an achievement loss in the transition to high school at 9<sup>th</sup> grade...High school dropout rates were higher for districts with grade 6-8 middle schools than for districts with K-8 elementary schools. (p. 20)

In a paper presented at the annual meeting of the American Educational Research Association in 1999, Alspaugh concluded that:

1. Students suffer achievement loss every time they make a transition from one grade grouping to another.
2. Students usually regain achievement losses during the following year.

3. The later the year of the transition to high school, the greater the risk of dropping out.
4. The results of his latest research supported previous research conclusions “that school district organization may be associated with educational outcomes” (p. 14) and “imply that school districts should study the grade level organization of their attendance centers as a potential strategy for reducing their high school dropout rate” (p. 15).

Abella (2005), tracking sixth grade students through ninth grade in Miami-Dade County in Florida, found sixth grade “K-8 students academically outperforming comparable students attending traditional middle schools” (p. 29), as well as showing better attendance and lower suspension rates. Like Alspaugh, Abella also noted that the deficits ascribed to the 6-8 students were short-lived. By the time the students completed ninth grade, the academic scores of the 6-8 students matched those of the K-8 cohort.

As economists, Bedard and Do (2005) provided a unique perspective on grade span configuration in their research, noting that “given the explicit nature of the claims made by middle school advocates, and the massive shift from junior high schools to middle schools over the past 15 years, it is somewhat surprising that economists have completely ignored this potentially important structural change” (p. 661). Their study focused on the impact of the move in the U.S. to middle schools for on-time completion of high school, with the underlying precept that “since high school dropouts earn lower wages, are more likely to be unemployed, and more likely to participate in criminal activities, the negative economic implications of less on-time high school completion may be far reaching and multifaceted” (p. 661). Using data from the National Center for Education Statistics (NCES) Common Core of Data to compare high school completion rates of school districts before and after adopting middle schools (defined as a change in

the placement of sixth grade students), Bedard and Do found that “the movement to a middle school system is associated with a 1-3 percent fall in the on-time high school completion rate” (p. 661).

With the increasing interest in grade span configuration nationwide, more recent studies have been conducted. Rickles and White (2005) followed up on two previous studies conducted by the Los Angeles Unified School District (LAUSD) that had found that achievement declines occurred in the year of the transition to middle school: sixth grade students in K-6 elementary schools had higher student achievement than those in 6-8 middle schools and that seventh grade students who had come to the middle school from K-6 schools had greater declines in student achievement than those who had been in sixth grade in the middle school. By comparing elementary and middle schools that had been matched on California’s School Characteristics Index (SCI), they controlled for the background, including socioeconomic status, of the schools. The study confirmed that the achievement gains in both reading and math were significantly higher for sixth grade students in K-6 schools and that “the higher gains K-6 students had relative to their middle school peers in sixth grade are not sustained once they matriculate to middle school” (p. 4). The researchers speculated, “The transition from elementary school to middle school may be the primary cause of lower test scores for sixth graders in middle schools (p. 4). To determine whether the “relatively high gains sixth graders in elementary schools achieve are cancelled out by their relatively lower seventh grade gains” (p. 5), Rickles and White examined two year gains and determined that “the achievement gains experienced by sixth graders in K-6 elementary schools, while diminished by the transition into middle school, still persist through seventh grade” (p. 5).

Despite achievement losses due to the middle school transition, students who spent their sixth grade year in an elementary configuration showed greater net gains than those who transitioned to middle school in sixth grade.

Unlike the majority of the other research indicating that sixth grade students demonstrate higher academic achievement in an elementary configuration rather than a middle or junior high one, Whitley, Lupart, and Beran (2007) found “no differences in academic achievement between students who transitioned to grade seven from an elementary school in comparison to those who remained in the same school” (p. 649). This Canadian study followed the transition of a group of fifth grade students, some of whom remained in their elementary schools, some who moved to junior high schools. Unlike other studies that primarily used standardized assessments to measure student achievement, Whitley et al. measured achievement as reported by teachers, parents, and the students themselves. These data were reported in the 1997 National Longitudinal Survey of Children and Youth. The self-reported measures of achievement, rather than the use of standardized measures, could account for the different results. The researchers conceded, “The research that exists (Alspaugh, 1998; Simmons & Blyth, 1987; Wigfield & Eccles, 1994) and theory supporting this research (e.g. Eccles et al., 1993) contradict our findings” (Whitley et al., 2007). They noted that U.S. studies may not be applicable to Canadian schools.

Yecke (2006) cited research from school districts in Milwaukee, Baltimore, and Philadelphia that studied the difference between the academic success of 6<sup>th</sup>, 7<sup>th</sup>, and 8<sup>th</sup> grade students who were enrolled in K-8 schools versus those who attended K-5 or K-6 schools and then transitioned to 6-8 or 7-8 middle schools. In every case, researchers



found that students in the K-8 schools outperformed students in the middle schools on standardized achievement tests and continued to outperform them into high school on other measures such as GPA, graduation rate, and acceptance into the districts' competitive high schools (p. 21-22). Yecke recommended that sixth grade be regarded as a transition year for students in a K-8 school as they move from an elementary to an upper-level learning environment. Some elementary components, including recess, walking in lines, and learning centers, would remain in the sixth grade while activities that award greater freedom and flexibility would be added to help students make the change from an elementary to a secondary approach.

Having reviewed the research on the impact of grade configuration, Juvonen et al. (2004) noted:

Although the old K-8 configuration might serve students well, it is not necessarily the only option. The structure or configuration of the school that serves middle grades could remain flexible as long as the number of transitions is reduced and changes in the size and structure of schools, curriculum, and instruction are introduced gradually... We strongly encourage evaluation of alternative models for middle grades – models that do not require multiple transitions, allow better coordination of goals across grades K-12, and can foster academic rigor as well as provide social support. (p. 19)

A summary of the review of research is in Appendix B.

### Summary

An examination of the history and the research regarding grade configurations does not conclusively lead to an answer as to which configuration is most apt to yield higher student achievement. Klump (2006) summarized, “Results of the studies should be interpreted with caution as they are very few in number, can’t necessarily be generalized across schools, and don’t control for all possible variables” (para. 12). Like

any non-experimental research conducted in education, it is difficult to isolate any one variable that can be said to be causal because so many factors are in play at one time. Coladarci and Hancock (2002) examined some of the key research on the effects of grade span configuration on achievement and reminded readers, “Although these researchers attempted to take into account important confounding influences (e.g., socioeconomic status), there doubtless are other factors that, if considered, would change the results – perhaps markedly” (p. 2). Renchler (2000), referencing the research of Wihry and Coladarci (1992), noted that “the complex relationship among [a wide variety] of difficult-to-quantify variables presents an especially challenging research problem” and “study in this area is of critical importance because their findings call into question any simplistic assertion regarding the superiority of (nominally) middle level schools” (p. 2).

There are factors that complicate the research on grade level configuration. One is the extent to which activities that assist students to make transitions from one grade-level grouping to the next occur in schools. Another is the difficulty of accounting for the degree to which middle schools “actually implement the components of the middle school concept as a complete set, over time and with high fidelity” (Beane & Lipka, 2006, p. 27). These factors include “various practices promoted by the middle school concept [which] have independently shown considerable promise for improving achievement, engagement, and relationships: small teaching teams, authentic instruction, integrative curriculum, service learning, and affective mentorship” (Beane & Lipka, p. 27).

Although nearly every researcher calls for more study in this area, the majority of the studies that have been reviewed clearly point in one direction. Whatever the limitations of the studies, indications are that grade span configuration does impact

student achievement, at least for middle level students. Coladarci and Hancock (2002) remarked that “the consistency of grade span results is noteworthy” (p. 2). The majority of the research presented in this study indicates that sixth grade students demonstrate higher academic achievement in an elementary or K-8 configuration than they do in a secondary configuration.

Juvonen et al. (2004) drew several conclusions from education history and from research about middle grade configurations:

1. Grade level configurations often have more to do with problems related not to education but to a variety of pragmatic societal and practical concerns, such as overcrowded school buildings.
2. Early research on pre-teen development that pointed to the importance of separating sixth grade students from younger peers has been contradicted by later research that emphasizes the negative effects of an abrupt transition from elementary school.
3. “The onset of puberty is an especially poor reason for beginning a new phase of schooling, inasmuch as multiple simultaneous changes (for example, the onset of puberty and school transfer) are stressful and sometimes have long-lasting negative effects.” (p. 18)
4. The few studies that compared schools with different grade configurations suggest that young adolescents are more successful in K-8 schools than in configurations that require a transition to a different school. (p. 18-19)

This study continued the research in this area by examining the impact of grade configuration on sixth grade students in Florida. A glance at grade configurations throughout Florida reveals that there are a wide variety of grade spans that encompass the middle grades. The majority of them fall into one of six patterns: K-6, K-8, 6-8, 7-8, 7-9, and 7-12. In many cases, the configuration is fairly district-wide. In some cases, however, there is a mix of configurations within one district. The majority of schools in Florida serve middle grade students in a 6-8 span. A review of the literature on the

subject indicates that grade configurations are many times not the result of careful consideration of student needs, but are often pragmatic decisions based on shifting populations and available space.

In Brevard Public Schools, the majority of the schools are configured in a K-6, 7-8, or 9-12 pattern. Although there are a few combination schools that serve students in grades 7-12, all sixth grade students attend elementary schools. Also noteworthy is that Brevard's sixth grade students are consistently the highest performing students in the state on FCAT Reading and Mathematics. This fact has prompted Brevard's leadership to wonder whether this high academic achievement might be due, in part, to the fact that its sixth grade students are in elementary schools. This study investigated the impact of grade configuration on student achievement for sixth grade students.

### CHAPTER 3 METHODOLOGY

The purpose of this study was to determine if significant differences existed in the mean scale scores and learning gains of schools which included sixth grade students in different grade span configurations. This was determined for both reading and mathematics using the 2009 results of the criterion-referenced portion of Florida's annual statewide assessment instrument, the Florida Comprehensive Assessment Test (FCAT) and the appropriate components of the 2009 Florida School Grade. Mean FCAT Reading and Mathematics scores and the percentage of students who made annual learning gains are reported publicly for all tested grade levels (3-10) for all Florida public schools as a part of its School Grade accountability system. The University of Central Florida Institutional Review Board determined that this study did not fit the definition of human subjects research based on evidence that the research used secondary data which was publicly available. The IRB approval form is in Appendix A.

All public school students in Florida are required to take the FCAT unless the Individual Education Plan (IEP) of a student with disabilities indicates that it is not the appropriate assessment, and unless a limited English proficient (LEP) student has been exempted as a result of having been in an English for Speakers of Other Languages (ESOL) program for one year or less. FCAT results were reported for all students who participated in the test, including eligible students with disabilities and students in an ESOL program. Mean FCAT scores are reported for all schools, by grade level, for grades 3 through 10 in reading and mathematics. 2009 School Grades were based on the school-wide results of students on the 2009 FCAT and included the calculation of student learning gains in reading and mathematics (Florida Department of Education, 2007).

This chapter provides the study's research questions, hypotheses, and a description of the research design including population, data collection, and general procedures for analysis.

### Research Questions and Hypotheses

In general, the problem statement for this study can be summarized by the question "To what extent does the reading and mathematics achievement of sixth grade students differ based on the grade configuration of the school?" The study was guided specifically by the following research questions:

1. To what extent does sixth grade reading achievement of schools, as measured by mean scale score on FCAT Reading, differ based on the grade configuration of the school when controlling for socio-economic status of the school?

$H_0$ : There is no statistically significant difference in school sixth grade mean scale scores on FCAT Reading based on the grade configuration of the school when controlling for socio-economic status of the school.

2. To what extent does sixth grade mathematics achievement of schools, as measured by mean scale score on FCAT Mathematics, differ based on the grade configuration of the school when controlling for socio-economic status of the school?

$H_0$ : There is no statistically significant difference in school sixth grade mean scale scores on FCAT Mathematics based on the grade configuration of the school when controlling for socio-economic status of the school.

3. To what extent does sixth grade reading achievement of schools, as measured by the percentage of students making learning gains on FCAT Reading, differ based on the grade configuration of the school when controlling for socio-economic status of the school?

$H_0$ : There is no statistically significant difference in the percentage of sixth grade students demonstrating learning gains as reported by school on FCAT Reading based on the grade configuration of the school when controlling for socio-economic status of the school.

4. To what extent does sixth grade mathematics achievement of schools, as measured by the percentage of students making learning gains on FCAT Mathematics, differ based on the grade configuration of the school when controlling for socio-economic status of the school?

$H_0$ : There is no statistically significant difference in the percentage of sixth grade students demonstrating learning gains as reported by school on FCAT Mathematics based on the grade configuration of the school when controlling for socio-economic status of the school.

5. To what extent does sixth grade reading achievement of schools, as measured by mean scale score, differ based on the grade configuration of schools in Florida districts designated as Academically High Performing?

$H_0$ : There is no statistically significant difference between mean scale scores of schools on sixth grade FCAT Reading based on the grade configuration of schools in Florida districts designated as Academically High Performing.

6. To what extent does sixth grade mathematics achievement of schools, as measured by mean scale score, differ based on the grade configuration of schools in Florida districts designated as Academically High Performing?

$H_0$ : There is no statistically significant difference between mean scale scores of schools on sixth grade FCAT Mathematics based on the grade configuration of schools in Florida districts designated as Academically High Performing.

7. To what extent does sixth grade reading achievement of schools, as measured by the percentage of students making learning gains, differ based on the grade configuration of schools in Florida districts designated as Academically High Performing?

$H_0$ : There is no statistically significant difference in the percentage of sixth grade students demonstrating learning gains as reported by school on FCAT Reading based on the grade configuration of schools in Florida districts designated as Academically High Performing.

8. To what extent does sixth grade mathematics achievement of schools, as measured by the percentage of students making learning gains, differ based on the grade configuration of schools in Florida districts designated as Academically High Performing?

$H_0$ : There is no statistically significant difference in the percentage of sixth grade students demonstrating learning gains as reported by school on FCAT Mathematics based on the grade configuration of schools in Florida districts designated as Academically High Performing.

## Research Design

This quantitative, ex-post facto, non-experimental research study was designed to test whether significant differences in means existed in achievement measures for schools with sixth grade based on their grade span configurations. These tests were based on pre-existing/archival data provided publicly by the Florida Department of Education (FLDOE), primarily on its website.

Several different data elements were required for the study: school FCAT mean scale scores for reading and mathematics, the percentage of students who made learning gains by school in reading and mathematics, the percent of students in the free or reduced price lunch program, and the grade span configuration of each school with a sixth grade. These elements were retrieved from different FLDOE websites, including those that listed 2009 FCAT results by subject, school, and grade level and those that provided 2009 School Grade data. Scores of schools, not individual students, were used in the study, and all data were available publicly.

The mean sixth grade mathematics and reading FCAT scale scores for schools were posted on the Florida Department of Education's FCAT Scores and Reports web page (Florida Department of Education, 2009a). The percentage of students in grade 6 who made learning gains at each school was found on the FLDOE's Florida School Grades web page under the school level details report of the School Report Card (Florida Department of Education, (2009b). The School Grades website also gave, by school, the percentage of students participating in the free and reduced price lunch program as a measure of socioeconomic status. Data identifying the grade level configuration of every school in Florida was obtained from the FLDOE Florida Master School Identification



(MSID) file website (Florida Department of Education, 2009c). Grade span configurations were categorized by grade ranges, and, represented as a nominal scale.

Data from each of the separate websites were matched by school number and compiled in Microsoft Excel. These data were then put into the software program Statistical Package for the Social Sciences (SPSS) for statistical analysis.

### *Population*

The population for the study was comprised of the 2009 public schools in Florida identified as containing a sixth grade on the Florida Department of Education's Master School Identification (MSID) file, which includes school grade configuration as a component. The population included Florida public charter schools, but excluded schools not associated with one of Florida's 67 school districts (i.e., virtual schools, university lab schools). Those schools whose configurations represented the largest percentage of all possible grade span configurations in Florida were included: PK-6, 6-8, and PK-8. Schools that did not have enough students for the FLDOE to assign a sixth grade FCAT mean scale score to the school were excluded. Schools that did not generate a School Grade were excluded. The total population of schools that met the participation criteria was 826. Appendixes C and D provide detailed information about the number of Florida schools with sixth grades in all configurations.

In addition to seeking to determine whether significant differences existed in the mean scale scores and learning gains of reading and mathematics for all schools which included sixth grade students in different grade span configurations, this study also investigated whether those differences occurred similarly for schools in districts determined by the Florida Department of Education to be an Academically High

Performing School District for the 2008-2009 school year. A district is defined as academically high-performing if it (a) earns a District Grade of *A* for two consecutive years, (b) has no schools that have earned a School Grade of *F*, (c) complies with State class size requirements, and (d) has no findings in its annual financial audit (Academically High-Performing School Districts, 2009). Appendix E cites the statutory language establishing these criteria. The 21 Florida districts awarded this designation for the 2008-09 school year were Alachua, Brevard, Calhoun, Charlotte, Citrus, Clay, Gilchrist, Leon, Martin, Nassau, Okaloosa, St. Johns, Seminole, Wakulla, and Walton (Florida State Board of Education, 2009). Appendix F lists the qualifying districts and their qualifications. The population for these districts was all schools in the identified districts with matched data for FCAT scores and School Grades.

### *Sample*

Random samples were selected from each of the primary grade level configurations from all Florida schools with sixth grade in order to create equal sized groups to run an analysis of covariance (ANCOVA). These samples were used to test for significant differences in mean scale scores and learning gains in reading and mathematics between schools of different grade span configurations. A random sample of schools was also selected from amongst schools in the 2009 High Performing Districts for each grade configuration in order to test for significant differences in mean scale scores and learning gains in reading and mathematics between schools of different grade span configurations.

### *Data Collection*

The purpose of the study was to determine whether statistically significant differences in sixth grade mean student achievement scores and achievement gains in reading and mathematics existed between schools with sixth grade in differing grade configurations. School mean scale scores were reported as a part of the 2009 Florida Comprehensive Assessment Test (FCAT) Reading and Mathematics results. The percentage of students at each school who made learning gains based on a comparison of 2008 and 2009 FCAT Reading and Mathematics scores was reported on each school's Grade Level Details report. The dependent variables, reported as interval data by school, were FCAT Reading mean scale score, FCAT Mathematics mean scale score, the percentage of students with learning gains on FCAT Reading, and the percentage of students with learning gains on FCAT Mathematics. The independent variable was school grade configuration, which was converted to a nominal scale.

All of the information required to complete the analysis for this study was publically available secondary data. Data for the dependent variable, sixth grade mean reading scale score by school, was available on the Florida Department of Education (FLDOE) FCAT website at [http://fcat.fldoe.org/xls/2009/F09\\_GR06\\_RSCH.XLS](http://fcat.fldoe.org/xls/2009/F09_GR06_RSCH.XLS). Data for the dependent variable, sixth grade mean mathematics scale score by school, was available on the FLDOE FCAT website at [http://fcat.fldoe.org/xls/2009/F09\\_GR06\\_MSCH.XLS](http://fcat.fldoe.org/xls/2009/F09_GR06_MSCH.XLS). Data for the dependent variables, percentage of sixth grade students who made learning gains in reading and mathematics, as well as the covariate representing socioeconomic status (percentage of students participating in the federal free

or reduced price lunch program) were available on the FLDOE School Grade website at <http://schoolgrades.fldoe.org/xls/0809/SGschool20082009.xls>.

Each of these separate data sources were edited to eliminate data not required for the study and were combined in Microsoft Excel, eliminating non-matched records. Only those schools that were matched with 2009 mean FCAT scale scores for sixth grade reading and mathematics, learning gains for sixth grade reading and mathematics, and the percentage of students participating free and reduced price lunch were included in the study. These data were then put into the software program Statistical Package for the Social Sciences (SPSS) for statistical analysis.

### *Data Analysis*

In order to account for differences attributable to other factors, the statistical test analysis of covariance (ANCOVA) was employed using SPSS software for the samples from all Florida schools with grade six. ANCOVA is a specialized application of an analysis of variance (ANOVA) model, a statistical technique which helps to make inferences as to whether “means on a dependent variable are significantly different among groups” (Green & Salkind, 2008, p. 184). It also helps to determine whether there is a statistically significant mean difference between two or more samples by comparing the variability between the samples to the variability within the samples.

Analysis of covariance provides a method for the researcher to determine if there is a significant difference in mean scores between two or more groups, but also provides a method for controlling for the interaction effect of another variable. ANCOVA increases the power of ANOVA by adding an additional variable as the covariate, as long

as there is a strong correlation between the covariate and the dependent variable (Lomax, 2007, p. 280).

ANOVA can be extended to include one or more continuous variables that predict the outcome (or dependent variable). Continuous variables such as these, that are not part of the main experimental manipulation but have an influence on the dependent variable, are known as covariates and they can be included in an ANOVA analysis...If these variables are measured, then it is possible to control for the influence they have on the dependent variable by including them in the model...So we end up seeing what effect an independent variable has after the effect of the covariate. As such, we control for (or partial out) the effect of the covariate. (Field, 2008, p. 1)

Lomax (2007) explains that a covariate is used to “(a) reduce error variation, (b) take any preexisting group mean difference on the covariate into account, (c) take into account the relationship between the covariate and the dependent variable, and (d) yield a more precise and less biased estimate of the group effects” (p. 280). According to Field (2008), covariates are used in the analysis of the difference in means for two primary reasons:

1. To reduce within-group error variance: In ANOVA we assess the effect of an experiment by comparing the amount of variability in the data that the experiment can explain, against the variability that it cannot explain. If we can explain some of this ‘unexplained’ variance ( $SS_n$ ) in terms of other variables (covariables), then we can reduce the error variance, allowing us to more accurately assess the effect of the experimental manipulation ( $SS_m$ ).
2. Elimination of Confounds: In any experiment, there may be unmeasured variables that confound the results (i.e. a variable that varies systematically with the experimental manipulation). If any variables are known to influence the dependent variable being measured, then ANCOVA is ideally suited to remove the bias of these variables. Once a possible confounding variable has been identified, it can be measured and entered into the analysis as a covariate. (p. 1)

It was important to determine as much as possible that, if indeed there was a difference in academic achievement for schools with sixth grade students, it was grade

configuration that made the difference in mean scores, not other factors. One factor commonly associated with and linked to the academic achievement of schools is the socio-economic status (SES) of its students.

Raffo, Dyson, Gunter, Hall, Jones and Kalambouka (2007) examined the research linking income and achievement. They introduced their report by noting, "...all evidence over many decades and from many countries seems to show that family background continues to be a major determinant of educational outcomes for children and young people. Put simply, the poorer a child's family is, the less well they are likely to do in the education system" (p. 1). Lee and Burkam (2002), examining data from the U.S.

Department of Education, concluded:

Socioeconomic status is quite strongly related to cognitive skills. Of the many categories of factors considered - including race/ethnicity, family educational expectations, access to quality child care, home reading, computer use, and television habits - SES accounts for more of the unique variation in cognitive scores than any other factor by far. Entering race/ethnic differences are substantially explained by these other factors; SES differences are reduced but remain sizeable. (Executive Summary)

Research indicates that a strong relationship between socio-economic status and academic achievement exists. To test this assumption, a simple regression was conducted yielding a correlation between academic achievement in reading and math as measured by the percentage at proficiency on School Grade and the percentage of students eligible for the federal free or reduced price lunch program. The percentage of students eligible for free or reduced price lunch is the generally accepted indicator of socioeconomic status for schools. If a high correlation exists between achievement and SES status, then the link of SES to academic achievement can be assumed at specific grade levels. Using SES as a covariate in the ANCOVA statistical procedure opened the door for determining

the relationship between student achievement and grade level configuration, accounting for differences that may have existed because of the socio-economic status of the school.

Descriptive statistics were reported to describe the population of schools included in the study in greater detail, including the number and percentage of schools at each grade span configuration. The ANCOVA statistical data was analyzed to determine (a) whether the covariate was significant, (b) whether the mean reading and mathematics scores and learning gains for the different grade span configurations were different at the .05 significance level, and (c) what portion of the variance in scores was attributed to grade span configuration. Analysis of variance (ANOVA) was used to test samples from Academically High Performing Districts because of the homogeneity of their results.

### Summary

Chapter three presented the methodology used in this quantitative study. It included an introduction, the research questions and the related null hypotheses, and the research design. The research design included information about the study population, data collection, and data analysis. Included in those discussions were the selection of schools, brief descriptions of the Florida Comprehensive Assessment Test and Florida School Grades, the treatment of data, and how the collected data was used to respond to the research questions. The study, identified by the Institutional Review Board as one that uses secondary data which is publicly available, was exempted from IRB review.

## CHAPTER 4 ANALYSIS OF DATA

The problem posed in the study was whether Florida's sixth grade students in public schools, including Florida's public charter schools, demonstrate significantly different academic achievement in mathematics and reading dependent on the grade span configuration of the school. For purposes of this study, academic achievement was defined as the mean scale score for schools on the Florida Comprehensive Assessment Test (FCAT) in reading and mathematics and as the percentage of students at schools who made annual learning gains in reading and mathematics, defined as one year's academic growth from one year to the next as measured by a comparison of sequential FCAT scores. A random sample of schools from districts designated as Academically High Performing were also evaluated using the same parameters.

The statistical tests analysis of covariance (ANCOVA) and analysis of variance (ANOVA) were used as appropriate. The dependent variables were school FCAT Reading mean scale score, FCAT Mathematics mean scale score, the percentage of students at a school demonstrating reading gains, and the percentage of students at a school demonstrating mathematics gains as measured for the Florida School Grade. The independent variable was grade span configuration, for purposes of this study, PK-6, PK-8, and 6-8. The covariate, used in the ANCOVA analysis of the population of all Florida schools with a sixth grade, was socioeconomic status (SES), measured as the percentage of students at a school participating in the Federal Free or Reduced Price Lunch Program.



## Descriptive Statistics

### *Population*

There are 67 school districts in Florida. Within those 67 districts, there were 1212 schools in 2009 that contained sixth grade classes. Of those 1212 schools with Florida Comprehensive Assessment Test (FCAT) results, 869 also received a Florida School Grade. Those 869 schools matched for FCAT scores and Florida School Grade were used to select the sample used in the study. The source of school mean FCAT scale scores for reading and math was the Florida Department of Education *FCAT Scores and Reports* website (Florida Department of Education, 2009a). The source of Florida School Grades for each school was the Florida Department of Education *Florida School Grades* website (Florida Department of Education, 2009b).

### *Grade Configurations of Population*

The grade span configurations of all Florida public schools with sixth grade were compiled from the Florida Department of Education's Master School Identification (MSID) File (Florida Department of Education (FLDOE), 2009c). According to the Master School Identification File Technical Assistance Paper, the file is "maintained by the Department of Education (DOE) to ensure the Department provides accurate identification and directory information on each Florida public school in the state" (FLDOE, 2009d, p. 1). Included in the file is each school's Grade Code, which identifies "the grade levels of the students served by the school" (FLDOE, 2009d, p. 3).

A count of the schools with grade codes that included sixth grade indicated that there were 1,212 public schools in Florida during the 2008-2009 school year in 30

different grade span configurations. Eliminating from the list schools with sixth grades that did not have FCAT scores matched to a School Grade yielded 869 schools with matched records sufficient to complete an analysis of the data. Table 4 shows the number of schools with sixth grade at each grade span with more than ten schools.

Table 4  
The Number and Percentage of Florida Public Schools with Sixth Grade in Configurations with More Than Ten Schools During the 2008-2009 School Year

Span	All Florida Schools		Matched Florida Schools	
	Number	Percent	Number	Percent
6-8	544	45%	529	61%
PK-6	146	12%	130	15%
6-12	131	11%	26	3%
PK-8	115	9%	106	12%
PK-12	66	5%	12	1%
5-8	16	1.3%	12	1%
Other	194	16%	54	6%
Total	1212	100%	869	100%

Schools for which there was no match between FCAT scores and School Grade generally were alternative schools serving special populations such as students with disabilities or students pending expulsion, new schools that do not receive a School Grade, or schools too small to earn a School Grade. The majority of the unmatched schools were charter schools: Florida public schools under their own governance.

Because schools with PK-12, 6-12, 5-8, and Other configurations represented such a small percentage of the total when FCAT scores and School Grades were matched, they were not used in the statistical analysis. The grade span configurations that had the

most significant drops when unmatched schools were removed were 6-12 (which declined from 131 schools to 26, a decrease of 80%), PK-12 (which declined from 66 schools to 12, a decrease of 82%), and 6-11 (which declined from 27 schools to 1, a decrease of 96%). The Other category was comprised of 23 different configurations including one called intermittent (with non-consecutive grade offerings). Each of these configurations comprised less than one percent of the total. The number of schools in the Other category declined from 194 to 54 (a decrease of 72%) when matched for FCAT and School Grade. The numbers of schools in all configurations, before and after matching, are found in Appendixes B and C.

The grade span configurations used in this study were the three largest, 6-8 (61%), PK-6 (15%), and PK-8 (12%). They comprised 90% of all matched schools.

#### *High Performing District Schools in Population*

Of the 869 schools that were matched for FCAT scores and Florida School Grade, 179 were in Florida High Performing Districts. The 2009 High Performing Districts were Alachua, Brevard, Calhoun, Charlotte, Citrus, Clay, Gilchrist, Leon, Martin, Nassau, Okaloosa, St. Johns, Seminole, Wakulla, and Walton. These districts met the requirements of having earned a district grade of A, having no school earn a grade of F, being in compliance with class size requirements, and being in compliance with financial audit standards (Academically High Performing Districts, 2009).

Of the 179 schools in the High Performing Districts, 81 were in a PK-6 configuration, 63 in a 6-8 configuration, 13 in a PK-8 configuration, and 22 in various configurations consisting of three or fewer schools (see Table 5). The 157 schools in PK-6, 6-8, and PK-8 configurations were used in the study of High Performing Districts.

Table 5  
Grade Span Configurations of Schools in Academically High Performing Districts

Configuration	Number of Schools	Percent of High Performing Schools	Percent of 869 Matched Schools
PK-6	81	45.3%	9.3%
6-8	63	35.2%	7.2%
PK-8	13	7.3%	1.5%
Other	22	12.3%	2.5%
Total	179		

*Charter Schools in Population*

Florida charter schools, public schools that are authorized by but independent of local school boards, were included in the population for this study. Of the 139 charter schools included in the study, 55 were 6-8 schools, 46 were PK-8 schools, 13 were PK-6 schools, five were 6-12 schools, and 20 were classified as Other. Charter schools account for a disproportionate number of the grade span configurations in the Other category. Of the 869 schools with sixth grade that were matched with FCAT scores and a School Grade, 139 (16%) were charters. Although charter schools only represent 16% of all schools with sixth grade in Florida, 43% of the 106 PK-8 schools were charters and 33% of the 54 schools with configurations listed as Other were charters. They were underrepresented in the two largest categories, PK-6 and 6-8, comprising only 10% of each category. The representation of charter schools is summarized in Table 6.

Table 6  
 Charter School Representation in Grade Span Configurations with Grade 6

	PK-6	PK-8	6-8	6-12	Other
Of 139 charters, # at each configuration	13	46	55	5	20
Of 139 charters, % at each configuration	9%	33%	40%	4%	14%
Of 869 total schools, # at each configuration	130	106	529	26	54
% of schools at each configuration that are charters	10%	43%	10%	19%	33%

### *Samples*

For the portion of the study addressing all schools with a grade 6, a random sample of 100 cases from each of the three primary grade configurations (PK-6, PK-8, and 6-8) was determined. “The sample size in each group should be equal or approximately equal” because analysis of variance is “relatively sensitive to variations in sample size between groups” (Burns & Grove, 2005, p. 532). Using SPSS, a random selection of 100 cases each was made from the 529 6-8 schools, the 130 PK-6 schools, and the 106 PK-8 schools. These random samples of 100 were merged into one file for statistical analysis.

For the portion of the study addressing High Performing Districts, analysis was conducted three different ways. First, the population of 157 schools with the three largest configurations (PK-6, 6-8, and PK-8) was used. An evaluation using all cases of just the two largest configurations (PK-6 and 6-8) and an evaluation using random samples taken

from the PK-6 and 6-8 groups to create equal sized groups were also completed to determine the effect of removing the smallest group (PK-8).

## Findings

The problem statement for this study is summarized by the question “To what extent does the reading and mathematics achievement of sixth grade students differ based on the grade configuration of the school?” The study was guided specifically by a set of research questions and hypotheses.

### *Research Question and Hypothesis #1*

To what extent does sixth grade reading achievement of schools, as measured by mean scale score on FCAT Reading, differ based on the grade configuration of the school when controlling for socio-economic status of the school?

H<sub>0</sub>: There is no statistically significant difference in school sixth grade mean scale scores on FCAT Reading based on the grade configuration of the school when controlling for socio-economic status of the school.

An analysis of covariance (ANCOVA) was conducted to evaluate the difference in mean FCAT mean reading scale scores based on the grade span configuration of schools. The independent variable, grade span configuration, was comprised of three independent groups: PK-6, PK-8 and 6-8. The measure of the dependent variable, the school mean scale score in reading, was continuous. Socioeconomic status (SES), a factor related to student reading achievement, was used as a covariate to reduce error variance and reduce its bias on the dependent variable by serving as a statistical control.

The interaction between the covariate and the independent variable was found to be significant, thus violating the assumption of homogeneity of slopes. Because the interaction effect was significant ( $F_{2, 294}=8.3, p<.01$ ), the ANCOVA test could not be

used. The ANOVA test was used instead without the covariate. Having examined the residual plot, skewness and kurtosis statistics, and Levene’s homogeneity of variance test ( $p=.138$ ), the ANOVA assumptions were determined to be satisfied.

Using ANOVA on the data set of 300 schools with 100 schools at each configuration, there was a statistically significant difference in school FCAT reading mean scale scores based upon school configuration ( $F_{2, 297}=11.4, p<.01$ ). Approximately 7% of the variance in scores could be accounted for or explained by grade span configuration. Table 7 displays ANOVA results.

Table 7  
ANOVA Results for Reading Mean Scale Score and Grade Configuration

<b>Tests of Between-Subjects Effects</b>						
Dependent Variable:RdgMSS						
Source	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Config	9940.667	2	4970.333	11.402	.000	.071
Error	129466.000	297	435.912			
Corrected Total	139406.667	299				

a. R Squared = .071 (Adjusted R Squared = .065)

Because group sizes were equal, the Tukey post hoc test was used to compare groups by evaluating pairwise differences between the means. Tukey’s test showed that each grade configuration was significantly different from each other at the .05 level. PK-6 ( $M=323.9, SD=23.2$ ) was significantly different from PK-8 ( $M=316.9, SD=18.8$ ) and 6-8 ( $M=309.8, SD=20.4$ ), and PK-8 was significantly different from 6-8. Table 8 displays reading means and standard deviations.

Table 8  
Means and Standard Deviations: Reading Mean Scale Score by Grade Configuration

<b>Descriptive Statistics</b>			
Dependent Variable:RdgMSS			
Config	Mean	Std. Deviation	N
PK-6	323.90	23.195	100
PK-8	316.90	18.792	100
6-8	309.80	20.411	100
Total	316.87	21.593	300

Because the analysis of covariance could not be completed for reading mean scale score because of the interaction effect between the covariate SES and the independent variable grade span configuration, a second analysis was conducted using a different sample from the same population. Schools in the population from each of the three configurations were matched for School Grade. Three random groups of 79 schools in each configuration matched for School Grade became the new sample.

The results were the same as for the first test. It was found that the interaction between the covariate and the independent variable was significant ( $p < .01$ ), so the ANCOVA test could not be used. ANOVA was used instead without the covariate. The residual plot, skewness and kurtosis statistics, and Levene's homogeneity of variance test ( $p = .106$ ) indicated that the ANOVA assumptions were satisfied.

Using ANOVA on the data set of 237 schools with 79 schools at each configuration, there was a statistically significant difference in FCAT reading mean scale scores based upon school configuration ( $F_{2, 234} = 3.6, p < .05$ ). About 3% of the variance in scores could be explained by grade configuration. Table 9 displays ANOVA results.



Table 9  
ANOVA Results for Reading Mean Scale Score and Grade Configuration for Groups Matched for School Grade

<b>Tests of Between-Subjects Effects</b>						
Dependent Variable:RdgMSS						
Source	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Config	2592.160	2	1296.080	3.562	.030	.030
Error	85152.962	234	363.902			
Corrected Total	87745.122	236				

a. R Squared = .030 (Adjusted R Squared = .021)

Because group sizes were equal, the Tukey post hoc test was used to evaluate pairwise differences between the means. Tukey's test showed the mean of the PK-6 configuration to be significantly different from the mean of the 6-8 configuration at the .05 level. The mean of PK-6 ( $M=323.32$ ,  $SD=22.2$ ) was significantly different from the mean of 6-8 ( $M=315.2$ ,  $SD=18.8$ ) but not significantly different from the mean of PK-8 ( $M=318.9$ ,  $SD=15.6$ ). The mean of PK-8 was not significantly different from that of 6-8. Table 10 displays reading means and standard deviations.

Table 10  
Means and Standard Deviations: Reading Mean Scale Score by Grade Configuration for Groups Matched by School Grade

<b>Descriptive Statistics</b>			
Dependent Variable:RdgMSS			
Config	Mean	Std. Deviation	N
PK-6	323.32	22.2	79
PK-8	318.90	15.6	79
6-8	315.20	18.8	79
Total	316.87	21.593	237

## *Research Question and Hypothesis #2*

To what extent does sixth grade mathematics achievement of schools, as measured by mean scale score on FCAT Mathematics, differ based on the grade configuration of the school when controlling for socio-economic status of the school?

H<sub>0</sub>: There is no statistically significant difference in school sixth grade mean scale scores on FCAT Mathematics based on the grade configuration of the school when controlling for socio-economic status of the school.

An analysis of covariance (ANCOVA) was conducted to evaluate the difference in mean FCAT mean mathematics scale scores based on the grade span configuration of schools. The independent variable, grade span configuration, was comprised of three independent groups: PK-6, PK-8 and 6-8. The measure of the dependent variable, the school mean scale score in mathematics, was continuous. Socioeconomic status (SES), a factor related to student mathematics achievement, was used as a covariate to reduce error variance and reduce its bias on the dependent variable by serving as a statistical control.

It was found that the interaction between the covariate and the independent variable was not significant ( $F_{2, 294}=2.4, p=.093$ ). Because the interaction effect was not significant, the interaction was removed and the ANCOVA test was applied. Having examined the residual plot, skewness and kurtosis statistics, and Levene's homogeneity of variance ( $p=.056$ ), the ANCOVA assumptions were determined to be satisfied.

Using ANCOVA on the data set of 300 schools with 100 schools randomly selected at each configuration, both the group (configuration), and the covariate socioeconomic status (SES), were found to be significant. Accounting for SES, there was a statistically significant difference ( $F_{2, 296}=29.4, p<.01$ ) in school FCAT mathematics

mean scale scores between grade span configurations. Grade configuration accounted for about 17% of the variance in score. In addition, the covariate SES was found to be a significant contributor to school FCAT Mathematics mean scale score ( $F_{1,296}=296.6$ ,  $p<.01$ ). SES accounted for 50% of the variance in mean scale score. Table 11 displays the ANCOVA results.

Table 11  
ANCOVA Results for School Mathematics Mean Scale Score and Grade Configuration Controlling for SES

<b>Tests of Between-Subjects Effects</b>						
Dependent Variable: MathMSS						
Source	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Corrected Model	112962.794 <sup>a</sup>	3	37654.265	123.795	.000	.556
SES	90212.067	1	90212.067	296.587	.000	.500
Config	17870.856	2	8935.428	29.377	.000	.166
Error	90033.393	296	304.167			
Total	3.099E7	300				
Corrected Total	202996.187	299				

a. R Squared = .556 (Adjusted R Squared = .552)

The post hoc analysis indicated that the adjusted FCAT mathematics mean scale score for the PK-6 schools ( $M=331.2$ ,  $SE=1.7$ ) was significantly higher than the means for PK-8 ( $M=314.0$ ,  $SE=1.8$ ) and 6-8 ( $M=315.9$ ,  $SE=1.8$ ) schools. There was not a significant difference in adjusted FCAT mathematics mean scale scores between schools with PK-8 and schools with 6-8 configurations. Table 12 provides a comparison of means and standard deviations and Table 13 provides differences in means.

Table 12  
Means and Standard Deviations for School Mathematics Mean Scale Scores by Grade Configuration Controlling for SES

Group/ Configuration	Raw Mean Score	<i>SD</i>	Adjusted mean score	<i>SE</i>
PK-6	332.3	26.2	331.2	1.75
PK-8	317.0	24.8	314.0	1.75
6-8	311.8	22.7	315.9	1.76

Table 13  
Differences in School Mathematics Mean Scale Scores by Grade Configuration Comparison Controlling for SES

Group Contrast	Difference in raw means	Difference in adjusted means	p value	Statistical Significance
PK-6 v PK-8	15.3	17.3	.000	Yes
PK-8 v 6-8	5.2	1.9	.448	No
PK-6 v 6-8	20.5	15.3	.000	Yes

### *Research Question and Hypothesis #3*

To what extent does sixth grade reading achievement of schools, as measured by the percentage of students making learning gains on FCAT Reading, differ based on the grade configuration of the school when controlling for socio-economic status of the school?

H<sub>0</sub>: There is no statistically significant difference in the percentage of sixth grade students demonstrating learning gains as reported by school on FCAT Reading based on the grade configuration of the school when controlling for socio-economic status of the school.

An analysis of covariance (ANCOVA) was conducted to evaluate the difference in the mean percentage of students making learning gains in reading based on the grade span configuration of schools. The independent variable, grade span configuration, was comprised of three independent groups: PK-6, PK-8 and 6-8. The measure of the dependent variable, the mean percentage of students making learning gains in reading, was continuous. Socioeconomic status (SES), a factor related to student reading achievement, was used as a covariate to reduce error variance and reduce its bias on the dependent variable by serving as a statistical control.

It was found that the interaction between the covariate and the independent variable was not significant ( $F_{2, 276}=1.9, p=.145$ ). Because the interaction effect was not significant, the interaction was removed and the ANCOVA test was applied. Levene's test for homogeneity of variance showed significance ( $p=.001$ ), indicating that error variances were not equal across groups. However, Lomax (2007) says, "A summary of Monte Carlo research on ANCOVA assumptions violations by Harwell (2003) indicates that the effect of the violation is negligible with equal or nearly equal  $n$ 's across the groups" (p. 286). Because the group sizes were equal for this study, equal variances were

assumed. Having examined the residual plot, skewness and kurtosis statistics, the ANCOVA assumptions were determined to be satisfied.

Using ANCOVA on the data set of 300 schools with 100 schools randomly selected at each configuration, both the group (configuration), and the covariate (SES), were found to be significant. After accounting statistically for socioeconomic status (SES), there was a statistically significant difference ( $F_{2,278}=27.2, p<.01$ ) in the percent of students with learning gains in reading based on grade span configuration. Grade configuration accounted for approximately 16% of the variance in percent of students with learning gains in reading. In addition, the covariate SES was found to be a significant contributor to the percent of students with learning gains in reading ( $F_{1,278}=79.7, p<.01$ ). SES accounted for approximately 22% of the variance in score. Table 14 displays the ANCOVA results.

Table 14  
ANCOVA Results for Percent of Students with Learning Gains in Reading and Grade Span Configuration Controlling for SES

<b>Tests of Between-Subjects Effects</b>						
Dependent Var: SGRdgGain						
Source	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Corrected Model	8260.898 <sup>a</sup>	3	2753.633	50.645	.000	.353
SES	4334.900	1	4334.900	79.728	.000	.223
Config	2956.403	2	1478.201	27.187	.000	.164
Error	15115.088	278	54.371			
Total	1472046.000	282				
Corrected Total	23375.986	281				

a. R Squared = .353 (Adjusted R Squared = .346)

The post hoc analysis indicated that the adjusted mean percent of students making reading learning gains for the PK-6 schools ( $M=75.6$ ,  $SE =0.74$ ) was significantly higher than the mean for PK-8 ( $M=71.4$ ,  $SE =0.8$ ) and 6-8 ( $M=67.8$ ,  $SE=0.76$ ) schools. There was also a significant difference between schools with PK-8 and 6-8 configurations. Table 15 provides a comparison of means and standard deviations and Table 16 provides differences in means.

Table 15  
Means and Standard Deviations for Percent of Students with Learning Gains in Reading by Grade Span Configuration Controlling for SES

Group/ Configuration	Raw Mean Score	<i>SD</i>	Adjusted mean score	<i>SE</i>
PK-6	75.8	7.8	75.6	1.75
PK-8	72.2	9.6	71.4	1.75
6-8	66.9	7.6	67.8	1.76

Table 16  
Differences in Mean Percent of Students with Learning Gains in Reading by Grade Span Configuration Controlling for SES

Group Contrast	Difference in raw means	Difference in adjusted means	p value	Statistical Significance
PK-6 v PK-8	3.6	4.2	.000	Yes
PK-8 v 6-8	8.9	7.8	.000	Yes
PK-6 v 6-8	5.3	3.6	.002	Yes

#### *Research Question and Hypothesis #4*

To what extent does sixth grade mathematics achievement of schools, as measured by the percentage of students making learning gains on FCAT Mathematics, differ based on the grade configuration of the school when controlling for socio-economic status of the school?

H<sub>0</sub>: There is no statistically significant difference in the percentage of sixth grade students demonstrating learning gains as reported by school on FCAT Mathematics based on the grade configuration of the school when controlling for socio-economic status of the school.

An analysis of covariance (ANCOVA) was conducted to evaluate the difference in the mean percentage of students making learning gains in mathematics based on the grade span configuration of schools. The independent variable, grade span configuration, was comprised of three independent groups: PK-6, PK-8 and 6-8. The measure of the dependent variable, the mean percentage of students making learning gains in mathematics, was continuous. Socioeconomic status (SES), a factor related to student mathematics achievement, was used as a covariate to reduce error variance and reduce its bias on the dependent variable by serving as a statistical control.

It was found that the interaction between the covariate and the independent variable was not significant ( $F_{2, 276}=0.7, p=.503$ ). Because the interaction effect was not significant, the interaction was removed and the ANCOVA test was run. Levene's Test of Equality of Error Variance was also not significant ( $p=.385$ ). Having examined Levene's test, the residual plot, and skewness and kurtosis results, the ANCOVA assumptions were determined to be satisfied.

Using ANOVA on the data set of 300 schools with 100 schools at each configuration, there was a statistically significant difference in the percentage of students with learning gains in mathematics based upon school configuration ( $F_{2, 278}=48.3, p<.01$ ).



Approximately 26% of the variance in percentages could be accounted for or explained by grade span configuration when controlling for SES. Additionally, the covariate socioeconomic status (SES) was statistically significant ( $F_{1,278}=37.1, p<.01$ ). SES accounted for almost 12% of the variance in percentages. The ANCOVA results are displayed in Table 17.

Table 17  
ANCOVA Results for Percent of Students with Learning Gains in Mathematics and Grade Span Configuration Controlling for SES

<b>Tests of Between-Subjects Effects</b>						
Dependent Var:SGMathGain						
Source	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Corrected Model	22215.569 <sup>a</sup>	3	7405.190	48.848	.000	.345
SES	5617.677	1	5617.677	37.057	.000	.118
Config	14634.134	2	7317.067	48.267	.000	.258
Error	42143.810	278	151.596			
Total	1058193.000	282				
Corrected Total	64359.379	281				

a. R Squared = .345 (Adjusted R Squared = .338)

The post hoc analysis for mathematics gains using SES as a covariate showed that the adjusted mean of the PK-6 schools ( $M=68.6, SE=1.2$ ) was significantly higher than the means for PK-8 ( $M=57.4, SE=1.3$ ) and 6-8 ( $M=51.5, SE=1.3$ ) schools. There was also a significant difference the percent of students with learning gains in mathematics between schools with PK-8 and schools with 6-8 configurations. Table 18 provides a

comparison of means and Table 19 provides differences in means. Appendix G provides a summary of the data and the results of each statistical test for all students

Table 18  
Means and Standard Deviations for Percent of Students with Learning Gains in Mathematics by Grade Span Configuration for Controlling for SES

Group/ Configuration	Raw Mean Score	<i>SD</i>	Adjusted mean score	<i>SE</i>
PK-6	68.8	13.4	68.6	1.23
PK-8	58.3	13.4	57.4	1.34
6-8	50.5	12.5	51.5	1.27

Table 19  
Differences in Mean Percent of Students with Learning Gains in Mathematics by Grade Span Configuration Controlling for SES

Group Contrast	Difference in raw means	Difference in adjusted means	p value	Statistical Significance
PK-6 v PK-8	10.5	11.2	.000	Yes
PK-8 v 6-8	7.8	5.9	.000	Yes
PK-6 v 6-8	18.3	17.1	.002	Yes

## High Performing Districts

### *Research Question and Hypothesis #5*

To what extent does sixth grade reading achievement of schools, as measured by mean scale score, differ based on the grade configuration of schools in Florida districts designated as Academically High Performing?

H<sub>0</sub>: There is no statistically significant difference between mean scale scores of schools on sixth grade FCAT Reading based on the grade configuration of schools in Florida districts designated as Academically High Performing.

A one-way analysis of variance (ANOVA) was conducted to evaluate the difference in means of school reading mean scale scores based on the grade span configuration of schools in Academically High Performing Districts. The independent variable, grade span configuration, included three independent levels: PK-6, PK-8, and 6-8. The measure of the dependent variable, FCAT Reading mean scale score, was continuous and, based on Levene's Test of Equality of Error Variance ( $p=.373$ ), equal variances could be assumed.

Using ANOVA on the data set of 157 schools consisting of 81 PK-6 schools, 13 PK-8 schools, and 63 6-8 schools, there was a statistically significant difference ( $F_{2, 154}=5.1, p<.01$ ) in mean reading scale score based upon grade span configuration for schools in High Performing Districts. Just over 6% of the variance in score could be accounted for by grade configuration. ANOVA results are summarized in Table 20.

Because group sizes were not equal, the Sheffe post hoc test was used to evaluate pairwise differences among the means. The Sheffe test showed that for schools in High Performing Districts the mean reading scale score for the PK-6 configuration ( $M=331.4, SD =19.1$ ) was significantly higher than the mean for 6-8 ( $M=321.97, SD =16.93$ ). The

mean for the PK-6 configuration was not significantly different from that of the PK-8 configuration ( $M=323.1$ ,  $SD=19.2$ ), which was not different from the 6-8 configuration. Reading scale score means and standard deviations for the configurations of schools in High Performing Districts are displayed in Table 21.

Table 20  
ANOVA Results for Reading Mean Scale Score and Grade Configuration for Schools in High Performing Districts

**Tests of Between-Subjects Effects**

Dependent Variable:RdgMSS

Source	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Config	3376.775	2	1688.388	5.068	.007	.062
Error	51306.588	154	333.160			
Corrected Total	54683.363	156				

a. R Squared = .062 (Adjusted R Squared = .050)

Table 21  
Means and Standard Deviations: Reading Mean Scale Score by Grade Configuration for Schools in High Performing Districts

**Descriptive Statistics**

Dependent Variable:RdgMSS

Config	Mean	Std. Deviation	N
PK-6	331.42	19.083	81
PK-8	323.08	19.181	13
6-8	321.97	16.925	63
Total	326.94	18.723	157

ANOVA tests were also conducted with just the PK-6 and 6-8 configurations, eliminating the 13 cases of the PK-8 schools represented in the Academically High

Performing Districts. With groups of unequal sizes, the ANOVA for reading mean scale score was significant ( $F_{1, 142}=9.6, p<.01$ ), with just over 6% of the variance explained by grade span configuration. With groups of equal sizes, the ANOVA for reading mean scale score was also significant ( $F_{1, 124}=8.6, p<.01$ ), with 6.5% of the variance explained by configuration. In all three evaluations, the mean reading scale score for the K-6 configuration ( $M=331$ ) was significantly higher than that for the 6-8 configuration ( $M=322$ ).

#### *Research Question and Hypothesis #6*

To what extent does sixth grade mathematics achievement of schools, as measured by mean scale score, differ based on the grade configuration of schools in Florida districts designated as Academically High Performing?

$H_0$ : There is no statistically significant difference between mean scale scores of schools on sixth grade FCAT Mathematics based on the grade configuration of schools in Florida districts designated as Academically High Performing.

A one-way analysis of variance (ANOVA) was conducted to evaluate the difference in means of school mathematics mean scale scores based on the grade span configuration of schools in Academically High Performing Districts. ANOVA was applied to 157 schools consisting of 81 PK-6 schools, 13 PK-8 schools, and 63 6-8 schools. The independent variable, grade span configuration, included three independent levels: PK-6, PK-8, and 6-8. The measure of the dependent variable, FCAT Mathematics mean scale score, was continuous and, based on Levene's Test of Equality of Error Variance ( $p=.217$ ), equal variances could be assumed.

There was a statistically significant difference ( $F_{2, 154}=10.2, p<.01$ ) in mean mathematics scale score based upon grade span configuration for schools in High

Performing Districts. Nearly 12% of the variance in score can be accounted for by grade configuration. ANOVA results are summarized in Table 22.

Because group sizes were not equal, the Sheffe post hoc test was used to evaluate pairwise differences among the means. The Sheffe test showed that for schools in High Performing Districts the mathematics scale score mean for the PK-6 configuration (M=338.9, *SD* =22.9) was significantly higher than the mean for 6-8 (M=323.6, *SD* =17.9). The mean for the PK-6 configuration was not significantly different from that of the PK-8 configuration (M=324.7, *SD* =22.2), which was not different from the 6-8 configuration. Mathematics scale score means for the configurations of schools in High Performing Districts are displayed in Table 23.

Table 22  
ANOVA Results for Mathematics Mean Scale Score and Grade Configuration for Schools in High Performing Districts

**Tests of Between-Subjects Effects**

Dependent Variable: MathMSS

Source	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Config	8994.982	2	4497.491	10.204	.000	.117
Error	67876.318	154	440.755			
Corrected Total	76871.299	156				

a. R Squared = .117 (Adjusted R Squared = .106)

Table 23  
Means and Standard Deviations: Mathematics Mean Scale Score by Grade Configuration for Schools in High Performing Districts

<b>Descriptive Statistics</b>			
Dependent Variable: MathMSS			
Config	Mean	Std. Deviation	N
PK-6	338.94	22.941	81
PK-8	324.69	22.190	13
6-8	323.62	17.900	63
Total	331.61	22.198	157

ANOVA tests were also conducted with just the PK-6 and 6-8 configurations, eliminating the 13 cases of the PK-8 schools represented in the Academically High Performing Districts. With groups of unequal sizes, the ANOVA for mathematics mean scale score was significant ( $F_{1, 142}=19.1, p<.01$ ), with nearly 12% of the variance explained by grade span configuration. With groups of equal sizes, the ANOVA for mathematics mean scale score was also significant ( $F_{1, 124}=17.8, p<.01$ ), with 12.6% of the variance explained by configuration. In all three evaluations, the mean mathematics scale score for the K-6 configuration ( $M=339$ ) was significantly higher than that for the 6-8 configuration ( $M=324$ ).

### *Research Question and Hypothesis #7*

To what extent does sixth grade reading achievement of schools, as measured by the percentage of students making learning gains, differ based on the grade configuration of schools in Florida districts designated as Academically High Performing?

H<sub>0</sub>: There is no statistically significant difference in the percentage of sixth grade students demonstrating learning gains as reported by school on FCAT Reading based on the grade configuration of schools in Florida districts designated as Academically High Performing.

A one-way analysis of variance (ANOVA) was conducted to evaluate the difference in the mean percentage of students making learning gains in reading based on the grade span configuration of schools in Academically High Performing Districts. ANOVA was applied to 157 schools consisting of 81 PK-6 schools, 13 PK-8 schools, and 63 6-8 schools. The independent variable, grade span configuration, included three independent levels: PK-6, PK-8, and 6-8. The measure of the dependent variable, the percentage of students at a school who made learning gains in reading as measured by the Florida Comprehensive Assessment Test (FCAT) for the Florida School Grade, was interval/ratio and, based on Levene's Test of Equality of Error Variance ( $p=.058$ ), equal variances could be assumed.

There was a statistically significant difference ( $F_{2, 146}=21.8, p<.01$ ) in the mean percentage of students making learning gains in reading based upon grade span configuration for schools in High Performing Districts. Grade configuration accounted for 23% of the variance in the percentage making learning gains. ANOVA results are summarized in Table 24.

Because group sizes were not equal, the Sheffe post hoc test was used to evaluate pairwise differences among the means. It showed that the mean percentage of students



making learning gains in reading at schools with a PK-6 configuration ( $M=77.3$ ,  $SD=7.0$ ) was significantly higher than the mean for the schools with a 6-8 ( $M=69.1$ ,  $SD=7.1$ ) configuration in High Performing Districts. The reading gains mean for PK-6 was not significantly different from the mean for the PK-8 configuration ( $M=71.2$ ,  $SD=11.3$ ). The mean for the PK-8 configuration was not significantly different from that of the 6-8 configuration. Reading gains means for the configurations of schools in High Performing Districts are displayed in Table 25.

Table 24  
ANOVA Results for Mean Reading Gains and Grade Configuration for Schools in High Performing Districts

<b>Tests of Between-Subjects Effects</b>						
Dependent Var: SGRdgGain						
Source	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Config	2372.969	2	1186.485	21.844	.000	.230
Error	7929.997	146	54.315			
Corrected Total	10302.966	148				

a. R Squared = .230 (Adjusted R Squared = .220)

Table 25  
Means and Standard Deviations: Mean Reading Gains by Grade Configuration for Schools in High Performing Districts

<b>Descriptive Statistics</b>			
Dependent Variable:SGRdgGain			
Config	Mean	Std. Deviation	N
PK-6	77.32	7.002	78
PK-8	71.20	11.302	10
6-8	69.10	7.077	61
Total	73.54	8.344	149

ANOVA tests were also conducted with just the PK-6 and 6-8 configurations, eliminating the 13 cases of the PK-8 schools represented in the Academically High Performing Districts. With groups of unequal sizes, the ANOVA for the mean percent of students making learning gains in reading was significant ( $F_{1, 137}=46.8, p<.01$ ), with 25.4% of the variance explained by grade span configuration. With groups of equal sizes, the ANOVA for mean percent of students making learning gains in reading was also significant ( $F_{1, 122}=35.0, p<.01$ ), with 22.3% of the variance explained by configuration. In all three evaluations, the mean percent of students making learning gains in reading for the K-6 configuration ( $M=77$ ) was significantly higher than that for the 6-8 configuration ( $M=69$ ).

#### *Research Question and Hypothesis #8*

To what extent does sixth grade mathematics achievement of schools, as measured by the percentage of students making learning gains, differ based on the grade configuration of schools in Florida districts designated as Academically High Performing?

$H_0$ : There is no statistically significant difference in the percentage of sixth grade students demonstrating learning gains as reported by school on FCAT Mathematics based on the grade configuration of schools in Florida districts designated as Academically High Performing.

A one-way analysis of variance (ANOVA) was conducted to evaluate the difference in the mean percentage of students making learning gains in mathematics based on the grade span configuration of schools in Academically High Performing Districts. ANOVA was applied to 157 schools consisting of 81 PK-6 schools, 13 PK-8 schools, and 63 6-8 schools. The independent variable, grade span configuration, included three independent levels: PK-6, PK-8, and 6-8. The measure of the dependent

variable, the percentage of students at a school who made learning gains in mathematics as measured by the Florida Comprehensive Assessment Test (FCAT) for the Florida School Grade, was interval/ratio. Based on Levene's test for homogeneity of variance ( $p=.579$ ), equal variances could be assumed.

There was a statistically significant difference ( $F_{2, 147}=36.8, p<.01$ ) in the mean percentage of students making learning gains in mathematics based upon grade span configuration for schools in High Performing Districts. Just over 33% of the variance in the percentage of students at a school making learning gains in mathematics could be accounted for by grade configuration. ANOVA results are summarized in Table 26.

Because group sizes were not equal, the Sheffe post hoc test was used to evaluate pairwise differences among the means. It showed that the mean percentage of students making learning gains in mathematics at schools with a PK-6 configuration ( $M=71.2, SD=11.8$ ) was significantly higher than the mean for the schools with a 6-8 ( $M=53.5, SD=12.0$ ) configuration in High Performing Districts. The mean mathematics gain for the PK-6 configuration was not significantly different from the mean for the PK-8 configuration ( $M=62.8, SD=15.1$ ), which was not significantly different from that of the 6-8 configuration. Mathematics gains means for the configurations of schools in High Performing Districts are displayed in Table 27.

Table 26  
ANOVA Results for Mean Mathematics Gains and Grade Configuration for Schools in High Performing Districts

**Tests of Between-Subjects Effects**

Dependent Variable:SGMathGain

Source	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Config	10816.886	2	5408.443	36.783	.000	.334
Error	21614.188	147	147.035			
Corrected Total	32431.073	149				

a. R Squared = .334 (Adjusted R Squared = .324)

Table 27  
Means and Standard Deviations: Mean Mathematics Gains by Grade Configuration for Schools in High Performing Districts

**Descriptive Statistics**

Dependent Variable:SGMathGain

Config	Mean	Std. Deviation	N
PK-6	71.22	11.814	79
PK-8	62.80	15.076	10
6-8	53.49	12.029	61
Total	63.45	14.753	150

ANOVA tests were also conducted with just the PK-6 and 6-8 configurations, eliminating the 13 cases of the PK-8 schools represented in the Academically High Performing Districts. With groups of unequal sizes, the ANOVA for the mean percent of students making learning gains in math was significant ( $F_{1, 138}=76.3, p<.01$ ), with 35.6% of the variance explained by grade span configuration. With groups of equal sizes, the ANOVA for mean percent of students making learning gains in math was also significant

( $F_{1, 122}=66.9$ ,  $p<.01$ ), with 35.4% of the variance explained by configuration. In all three evaluations, the mean percent of students making learning gains in math for the K-6 configuration ( $M=71$ ) was significantly higher than that for the 6-8 configuration ( $M=53$ ).

Appendix H provides a summary of the data and results for each statistical test for schools in Academically High Performing Districts.

Chapter 5 presents the summary, conclusions, implications, and recommendations for further research.

## CHAPTER 5 FINDINGS AND RECOMMENDATIONS

The purpose of this study was to determine whether grade level configuration as structural element of school design in public schools had an impact on student academic achievement for students in grade 6, specifically in mathematics and reading. This information about the effect of grade span configuration on student achievement may assist educational leaders, as well as civic leaders and other decision-makers, as they strive to create better learning environments for students.

The problem posed in the study was whether or not Florida's sixth grade students in public schools, including Florida's public charter schools, demonstrated significantly different academic achievement in mathematics and reading dependent on the grade span configuration of the school. For purposes of this study, academic achievement was defined as the mean reading and mathematics scale scores for schools on the 2009 Florida Comprehensive Assessment Test (FCAT). It was also defined as the percentage of students at a school who made annual learning gains in 2009 as reported as a part of Florida's School Grade accountability system. Annual learning gains are defined as one year's academic growth as measured by a comparison of sequential FCAT scores. Grade configurations used in the study were Pre-kindergarten/Kindergarten- grade 6 (PK-6), Pre-kindergarten/Kindergarten- grade 8 (PK-8), and grades 6 through eight (6-8). These were the three most numerous grade configurations amongst Florida public schools that contained a grade 6 during the 2008-2009 school year.

## Research Questions and Hypotheses

1. To what extent does sixth grade reading achievement of schools, as measured by mean scale score on FCAT Reading, differ based on the grade configuration of the school when controlling for socio-economic status of the school?

H<sub>0</sub>: There is no statistically significant difference in school sixth grade mean scale scores on FCAT Reading based on the grade configuration of the school when controlling for socio-economic status of the school.

2. To what extent does sixth grade mathematics achievement of schools, as measured by mean scale score on FCAT Mathematics, differ based on the grade configuration of the school when controlling for socio-economic status of the school?

H<sub>0</sub>: There is no statistically significant difference in school sixth grade mean scale scores on FCAT Mathematics based on the grade configuration of the school when controlling for socio-economic status of the school.

3. To what extent does sixth grade reading achievement of schools, as measured by the percentage of students making learning gains on FCAT Reading, differ based on the grade configuration of the school when controlling for socio-economic status of the school?

H<sub>0</sub>: There is no statistically significant difference in the percentage of sixth grade students demonstrating learning gains as reported by school on FCAT Reading based on the grade configuration of the school when controlling for socio-economic status of the school.

4. To what extent does sixth grade mathematics achievement of schools, as measured by the percentage of students making learning gains on FCAT Mathematics, differ based on the grade configuration of the school when controlling for socio-economic status of the school?

H<sub>0</sub>: There is no statistically significant difference in the percentage of sixth grade students demonstrating learning gains as reported by school on FCAT Mathematics based on the grade configuration of the school when controlling for socio-economic status of the school.

5. To what extent does sixth grade reading achievement of schools, as measured by mean scale score, differ based on the grade configuration of schools in Florida districts designated as Academically High Performing?

H<sub>0</sub>: There is no statistically significant difference between mean scale scores of schools on sixth grade FCAT Reading based on the grade configuration of schools in Florida districts designated as Academically High Performing.

6. To what extent does sixth grade mathematics achievement of schools, as measured by mean scale score, differ based on the grade configuration of schools in Florida districts designated as Academically High Performing?

H<sub>0</sub>: There is no statistically significant difference between mean scale scores of schools on sixth grade FCAT Mathematics based on the grade configuration of schools in Florida districts designated as Academically High Performing.

7. To what extent does sixth grade reading achievement of schools, as measured by the percentage of students making learning gains, differ based on the grade configuration of schools in Florida districts designated as Academically High Performing?

H<sub>0</sub>: There is no statistically significant difference in the percentage of sixth grade students demonstrating learning gains as reported by school on FCAT Reading based on the grade configuration of schools in Florida districts designated as Academically High Performing.

8. To what extent does sixth grade mathematics achievement of schools, as measured by the percentage of students making learning gains, differ based on the grade configuration of schools in Florida districts designated as Academically High Performing?

H<sub>0</sub>: There is no statistically significant difference in the percentage of sixth grade students demonstrating learning gains as reported by school on FCAT Mathematics based on the grade configuration of schools in Florida districts designated as Academically High Performing.

### Summary of Results

Findings of this study focused on whether the null hypothesis for each research question was rejected or failed to be rejected, indicating whether grade span configuration did or did not impact student achievement, and on indicators of effect size. Effect size was reported by assessing statistical significance (measured by  $p$ ), assessing practical significance (measured by partial  $\eta^2$ ), and assessing the significance of the comparison of means for each pairwise grouping of configurations. Cohen's subjective standards, as cited in Grimes (2006), were used to interpret practical effect sizes as measured by partial  $\eta^2$ : small effect, .05; moderate effect, .1; large effect, .2 (p. 3).



Null Hypothesis #1 - Rejected: A statistically significant difference does exist in 2009 school sixth grade mean scale scores on FCAT Reading based on the grade configuration of the school.

Because a significant interaction effect was found between grade configuration and SES for the reading data, the ANCOVA test was not appropriate to answer this research question. Instead, ANOVA tests were run using two different data sets. The first used three randomly selected groups of 100 schools from each of the grade configurations (PK-6, PK-8, and 6-8). The second used three randomly selected groups of 79 schools that were matched for School Grade from each of the grade configurations.

Both ways the ANOVA was run, there was a statistically significant difference in mean FCAT reading scale scores for schools based on grade configuration, the first at the .01 level, the second at the .05 level. Evaluating practical significance using partial eta<sup>2</sup>, the first test showed that grade span configuration accounted for approximately 7% of the variance in mean reading score, considered to be between a small and moderate effect using Cohen's subjective standards (as cited by Grimes, 2006, p. 3). The second test showed that grade configuration explained 3% of the variance, considered to be a very small effect on mean scale score in reading.

Examining each grade configuration separately for the three randomly selected groups of 100, the PK-6 configuration was statistically significantly higher than both of the other configurations. The mean scale score for schools in a PK-6 configuration (M=324) was significantly higher than the means for both the PK-8 schools (M= 317) and the 6-8 schools (M=310). The mean for the PK-8 schools was significantly higher than that for the 6-8 schools. When the grade configurations were examined separately for the three randomly selected groups of 79 matched on School Grade, the K-6 mean

reading score was higher than that of the means of both other groups, but only significantly higher than the 6-8 mean. It also represented the only difference in any of the pair comparisons among the three groups that was significant.

Null Hypothesis #2 - Rejected: A statistically significant difference does exist in 2009 school sixth grade mean scale scores on FCAT Mathematics based on the configuration of the school when controlling for socio-economic status (SES) of the school.

Because no interaction effect was found between grade configuration and SES for the mathematics data, the ANCOVA test was appropriate to answer this research question. The ANCOVA was run on three randomly selected groups of 100 schools from each of the grade configurations (PK-6, PK-8, and 6-8).

Grade configuration did make a statistically significant difference in mean FCAT mathematics scale scores for schools at the .01 level. Evaluating practical significance using partial  $\eta^2$ , the ANCOVA showed that grade span configuration accounted for approximately 17% of the variance in mean mathematics score, considered to be between a moderate and large effect size based on Cohen's subjective standards (as cited by Grimes, 2006, p. 3). SES, on the other hand, was of very high practical significance, explaining 50% of the variance,

Examining the means of each of the grade spans, the PK-6 configuration was significantly higher than the other two configurations. The mean mathematics scale score for schools in a PK-6 configuration (M=331) was significantly higher than the means for the PK-8 schools (M= 314) and for the 6-8 schools (M=316). The means for the PK-8 and the 6-8 schools were not significantly different.

Null Hypothesis #3 - Rejected: There was a statistically significant difference in the percentage of sixth grade students demonstrating learning gains as reported by school for 2009 FCAT Reading based on the grade configuration of the school when controlling for socio-economic status of the school.

Because no interaction effect was found between grade configuration and SES for the reading gains data, the ANCOVA test was appropriate to answer this research question. The ANCOVA was run on three randomly selected groups of 100 schools from each of the grade configurations (PK-6, PK-8, and 6-8).

Grade configuration did make a statistically significant difference at the .01 level in the percentage of sixth grade students making learning gains in reading as reported by school. Practical significance measured using partial eta<sup>2</sup> indicates that grade span configuration accounted for approximately 16.5% of the variance in the percentage of students making learning gains in reading, considered to be between a moderate and a large effect size based on Cohen's subjective standards (as cited by Grimes, 2006, p. 3). SES had a large practical significance, explaining approximately 22% of the variance.

Examining the mean percentage of students making learning gains in reading for of each of the grade spans, the PK-6 configuration was significantly higher than the other two configurations. The mean percentage of students making reading gains for schools in a PK-6 configuration (M=75.6) was significantly higher than the means for the PK-8 schools (M= 71.4) and for the 6-8 schools (M=67.8). The means for the PK-8 and the 6-8 schools were also significantly different from each other.

Null Hypothesis #4 - Rejected: A statistically significant difference does exist in the percentage of sixth grade students demonstrating learning gains in mathematics as reported by school for 2009 FCAT based on the grade configuration of the school when controlling for socio-economic status of the school.

Because no interaction effect was found between grade configuration and SES for the reading gains data, the ANCOVA test was appropriate to answer this research question. The ANCOVA was run on three randomly selected groups of 100 schools from each of the grade configurations (PK-6, PK-8, and 6-8).

Grade configuration did make a statistically significant difference at the .01 level in the percentage of sixth grade students making learning gains in mathematics as reported by school. Practical significance measured using partial eta<sup>2</sup> indicated that grade span configuration accounted for nearly 26% of the variance in the mean percentage of students who made learning gains in reading, considered to be a very large effect size based on Cohen's subjective standards (as cited by Grimes, 2006, p. 3). SES accounted for approximately 12% of the variance in the percentage of students demonstrating learning gains in mathematics, which is considered a moderate effect size.

Examining the mean percentage of students making learning gains in reading for each of the grade spans, the mean for the PK-6 configuration was significantly higher than the other two configurations. The mean percentage of students making mathematics gains for schools in a PK-6 configuration (M=68.6) was significantly higher than the means for the PK-8 schools (M= 57.4) and for the 6-8 schools (M=51.5). The means for the PK-8 and the 6-8 schools were also significantly different from each other.

Null Hypothesis #5 - Rejected: A statistically significant difference does exist between mean scale scores of schools on sixth grade FCAT Reading based on the grade configuration of schools in Florida districts designated as Academically High Performing.

For schools in Academically High Performing Districts, the effect of grade span configuration on reading achievement as measured by FCAT mean scale score was consistent for the three data sets used to conduct the ANOVA. Means and effect sizes were nearly identical whether measuring for all schools with a sixth grade in PK-6, PK-8, and 6-8 configurations; for all schools in just the PK-6 and 6-8 configurations; or for equal sized groups with just the PK-6 and 6-8 configurations. Schools with a PK-6 configuration outscored the other configurations in all cases.

Grade configuration did make a statistically significant difference at the .01 level in school mean reading scale scores. Practical significance measured using partial  $\eta^2$ , however, indicated that grade span configuration only explained about 6% of the variance in the school mean scale score in reading, considered to be a small effect size based on Cohen's subjective standards (as cited by Grimes, 2006, p. 3).

Pairwise comparisons for the ANOVAs run for all three configurations showed that the mean for the PK-6 configuration was significantly higher for mean reading scale score. The mean reading scale score for schools in a PK-6 configuration (M=331) was significantly higher than the mean for schools in the 6-8 configuration (M=321). The mean for the PK-6 schools was not significantly different than that for the PK-8 schools (M=323). The mean for the PK-8 schools was not significantly different from the mean for the 6-8 schools.

Null Hypothesis #6 - Rejected: A statistically significant difference does exist between mean scale scores of schools on sixth grade FCAT Mathematics based on the grade configuration of schools in Florida districts designated as Academically High Performing.

For schools in Academically High Performing Districts, the effect of grade span configuration on reading achievement as measured by FCAT mean scale score was consistent for the three data sets used to conduct the ANOVA. Means and effect sizes were nearly identical whether measuring for all schools with a sixth grade in PK-6, PK-8, and 6-8 configurations; for all schools in just the PK-6 and 6-8 configurations; or for equal sized groups with just the PK-6 and 6-8 configurations. Schools with a PK-6 configuration outperformed the other configurations.

Grade configuration did make a statistically significant difference at the .01 level in school mean mathematics scale scores. For mathematics, practical significance measured using partial  $\eta^2$  indicated that grade span configuration explained about 12% of the variance in the school mean scale score, considered to be a moderate effect size based on Cohen's subjective standards (as cited by Grimes, 2006, p. 3).

Pairwise comparisons for the ANOVAs run for all three configurations showed that the mean for the PK-6 configuration was significantly higher for mean mathematics scale score. The mean mathematics scale score for schools in a PK-6 configuration (M=339) was significantly higher than the mean for schools in the 6-8 configuration (M=324). The mean for the PK-6 schools was not significantly different than that for the PK-8 schools (M=325). The mean for the PK-8 schools was not significantly different from that of the 6-8 schools.

Null Hypothesis #7 - Rejected: A statistically significant difference does exist in the mean percentage of sixth grade students demonstrating learning gains in reading as reported by school based on the grade configuration of schools in Florida's Academically High Performing Districts.

For schools in Academically High Performing Districts, the effect of grade span configuration on reading achievement as measured by the percentage of students making learning gains from 2008 to 2009 was consistent for the three data sets used to conduct the ANOVA. Means and effect sizes were nearly identical whether measuring for all schools with a sixth grade in PK-6, PK-8, and 6-8 configurations; for all schools in just the PK-6 and 6-8 configurations; or for equal sized groups with just the PK-6 and 6-8 configurations. The mean school percentage of students making learning gains in reading was greater for PK-6 schools than for PK-8 or 6-8.

Grade configuration did make a statistically significant difference at the .01 level in the mean school percentage of students making learning gains in reading. Practical significance, as measured using partial  $\eta^2$ , indicated that grade span configuration accounted for a range of approximately 22 to 25% of the variance in mean reading learning gains. Those are considered to be large effect sizes based on Cohen's subjective standards (as cited by Grimes, 2006, p. 3).

An examination of the pairwise comparisons of the ANOVAs for all three configurations showed that the mean percentage of students who made learning gains in reading was significantly higher for the PK-6 configuration. The mean percentage with reading gains for schools in a PK-6 configuration (M=77%) was significantly higher than the mean for schools in the 6-8 configuration (M=69%). The mean for the PK-6 schools was not significantly different than that for the PK-8 schools (M=71%). The mean for the PK-8 schools was not significantly different from that of the 6-8 schools.

Null Hypothesis #8 - Rejected: A statistically significant difference does exist in the mean percentage of sixth grade students demonstrating learning gains in reading as reported by school based on the grade configuration of schools in Florida's Academically High Performing Districts.

For schools in Academically High Performing Districts, the effect of grade span configuration on mathematics achievement as measured by the percentage of students making learning gains from 2008 to 2009 was consistent for the three data sets used to conduct the ANOVA. Means and effect sizes were nearly identical whether measuring for all schools with a sixth grade in PK-6, PK-8, and 6-8 configurations; for all schools in just the PK-6 and 6-8 configurations; or for equal sized groups with just the PK-6 and 6-8 configurations. The mean school percentage of students making learning gains in mathematics was greater for PK-6 schools than for PK-8 or 6-8.

Grade configuration did make a statistically significant difference at the .01 level in the mean school percentage of students making learning gains in mathematics. Practical significance, as measured using partial eta<sup>2</sup>, indicated that grade span configuration accounted for a range of approximately 33 to 36% of the variance in mean mathematics learning gains, considered to be very large effect sizes based on Cohen's subjective standards (as cited by Grimes, 2006, p. 3).

The pairwise comparisons of the ANOVAs for all three configurations showed that the mean percentage of students who made learning gains in mathematics was significantly higher for the PK-6 configuration. The mean percentage with mathematics gains for schools in a PK-6 configuration (M=71%) was significantly higher than the mean for schools in the 6-8 configuration (M=53%). The mean for the PK-6 schools was not significantly different from that for the PK-8 schools (M=63%). The mean for the PK-8 schools was not significantly different from that of the 6-8 schools.



## Comparisons of Means

In nearly every case when examining data for the samples from all schools with sixth grades in Florida in 2009, means for the dependent variables (mean scale scores and learning gains for both reading and math) followed the same grade span configuration pattern: the mean for the PK-6 configuration was the highest, PK-8 was second highest, and 6-8 was lowest. The only exception was the mathematics mean scale scores, for which the PK-6 mean remained the highest, but the PK-8 mean was lower than the 6-8 mean. Table 28 provides a comparison of means for each of the grade span configurations for each research question related to the mean performance of all schools in the statewide sample.

Table 28  
Mean Scores for Each Dependent Variable by Grade Configuration for Samples from All Schools in Florida

	Mean Reading Scale Score	Mean Math Scale Score	Mean % with Reading Gains	Mean % with Math Gains
PK-6	324	331	76%	69%
PK-8	317	314	71%	57%
6-8	310	316	68%	52%

In every case, the mean of the PK-6 configuration was statistically significantly higher than the mean of the 6-8 configuration in all tests using the samples from all schools with sixth grades in Florida. The mean of the PK-6 configuration was also significantly higher than the mean of the PK-8 configuration in every test except for the ANOVA for mean reading scale score run with the three configurations matched on School Grade. The mean of the PK-8 configuration was significantly higher than the

mean for the 6-8 configuration for all of the tests except for reading mean scale score for data matched on School Grade, and for mathematics mean scale score.

Similarly, in each case for schools in Academically High Performing Districts, means for the dependent variables (mean scale scores and learning gains for both reading and math) followed the same grade span configuration pattern. The mean for the PK-6 configuration was always the highest, PK-8 was second highest, and 6-8 was lowest. Also, in every case, the mean of the PK-6 configuration was significantly higher than the mean of the 6-8 configuration. Table 29 provides a comparison of means for configurations for each research question related to the mean performance of schools in Academically High Performing Districts.

Table 29  
Mean Scores for Each Dependent Variable by Grade Configuration for Samples from Academically High Performing Districts

	Mean Reading Scale Score	Mean Math Scale Score	Mean % with Reading Gains	Mean % with Math Gains
PK-6	331	339	77%	71%
PK-8	323	325	71%	63%
6-8	321	324	69%	53%

Appendix I provides a summary of the means for all schools and for schools in Academically High Performing districts. It also shows the differences in the means between the two groups.

## Summary of Results

The findings of this research were consistent with the majority of the reviewed research that studied the relationship between grade span configuration for middle level students and student achievement, especially studies that used state assessment results as dependent variables and which also controlled for socioeconomic status (Abella, 2005; Becker, 1987; Collins, 2006; Edds, 2006; Franklin & Glascock, 1996; Johnson, 2002; Klump, 2006, Renchler, 2000; Rickles & White, 2005; Tucker & Andrada, 1997; Vaccaro, 2000; Wihry, Coladarci, & Meadow, 1992). Like this study, the majority of the research supported the idea that middle level students demonstrate greater academic achievement in elementary configurations than in secondary ones. The differences are consistently significant between PK-6 and 6-8, with PK-6 consistently demonstrating the highest means in both reading and mathematics, and 6-8 consistently demonstrating the lowest means.

Every test using the three random groups of 100 schools, both from the population of all schools with sixth grades as well as from the population of schools in Academically High Performing Districts, showed a statistically significant difference in means at the .01 level for reading and mathematics, although practical significance was not as consistent. Effect sizes, measured by partial eta squared, ranged from 6% to 33%.

The mean reading scale score showed the lowest percentage of variance uniquely attributable to grade span configuration for all schools (7%) as well as for schools in Academically High Performing Districts (6%). These are considered small effect sizes (Cohen as cited by Grimes, 2006). The mean mathematics scale score showed more practical significance, with 17% of the variance uniquely attributable to configuration for

all schools (a moderate to large effect size), and 12% attributable to configuration for schools in Academically High Performing Districts (a moderate effect size).

Practical effect sizes were more significant for achievement as measured by reading and mathematics learning gains. Grade span configuration explained 16% of the variance in reading gains for the samples from all schools (a moderate to large effect size), but accounted for 23% of the variance for schools in Academically High Performing Districts (a large effect size). The greatest practical significance was evident for mathematics learning gains. Twenty-six percent of the variance in mathematics learning gains was uniquely attributable to configuration for samples from all schools, and 33% for schools in Academically High Performing Districts. Both of these are considered to be very large effect sizes.

#### Recommendations for Future Research

The research in this study was delimited to student achievement measured at the school level. Because of this, studying achievement over time using this model would be difficult since it cannot be assumed that students progress as a group from one grade to the next or from one school to the next. Studying individual student achievement would open the research opportunities to conduct longitudinal studies to track progress over time. Doing so would address issues highlighted by other researchers. Abella (2005), for example, found that although middle level students in elementary configurations had higher student achievement than their counterparts in middle schools, the benefits were short term and academic performance was fairly equal by the time students were in grade nine. Similarly, Alsbaugh (1998, 1999) studied student achievement as it related to grade configuration and concluded that the differences in achievement and school success

were not directly attributable to configuration, but to the number of transitions (and resultant educational disruptions) students experienced. Conducting this study at the student level would help substantiate and verify these findings.

Although research indicates that socioeconomic status may have the greatest impact on student achievement, this research could be expanded to include other external or fixed factors such as race or ethnicity, level of parent education, and gender. Even more importantly, this research would be enhanced and greatly extended by differentiating schools by internal variables that may impact student achievement beyond grade span configuration. These variables include the instructional design and practices adopted by the school to teach middle level students, whether in a configuration that includes elementary students, such as K-8 or K-12, or in a configuration that is considered to be secondary, such as 5-8, 6-8, or 6-12. Differentiating schools within a configuration according to whether and to what degree the school departmentalizes, tracks or groups students, or implements the middle school concept with fidelity would make an important contribution to the body of work on this topic. Other variables that characterize the nature of the school and could have implications for student achievement beyond configuration include teacher training, teacher turnover, planned transition experiences, teaching methods, assessment methods, discipline policies, and attendance policies. Future studies that include these factors would greatly fine tune the research beyond the impact of grade configuration.

Future studies could also be based on populations that are more diverse in their distribution of grade span configurations. In Florida, the majority of K-6 schools were found in three districts, Brevard, Clay, and Miami-Dade. By far, the majority of the

students in grade 6 in Florida are in 6-8 middle schools. Future studies could be conducted in areas where grade configurations are more evenly distributed.

Future studies could also move beyond measuring the impact of grade configuration on student achievement. They could measure impact on other measurable school factors such as attendance, discipline, suspensions, and grade point average. Future research could also associate configuration with personal factors such as student attitudes toward school and teachers, and with student self esteem.

Also, because of the blurred lines between the effects of grade span configuration and the effects of the transitions between grade level groupings, further research could explore the differences between achievement outcomes for grade span configurations in schools and school systems that do and do not have articulation and transition programs in effect. Research could focus on whether the poorer performance of the middle school is ameliorated by planned transition programs implemented at just the middle school, or at both the elementary and middle levels, regardless of the year of the transition.

### Implications for Policy and Practice

Grade configuration is a structural element of school design that is within the decision-making purview of school leaders. School board members and district administrators may choose how to configure grade levels based on criteria that may or may not have anything to do with the best academic interests of students. Information such as that provided in this study can help guide educational leaders toward decisions that may move schools and students toward improved achievement. The obvious recommendation based on the findings of this study and supported by the majority of similar studies included in the review of literature is that, as much as is practicable,

educational leaders and decision- and policy-makers should move toward creating grade level groupings that hold students for as long as possible in an elementary configuration, minimizing the number of transitions students must make.

In the conclusions and recommendations section of their review of middle level research conducted since the mid-1980s, Juvonen et al. (2004) listed as their first recommendation:

Over the coming years, states and school districts might consider alternative structures that allow them to reduce multiple transitions across grades K-12 and facilitate alignment of goals, curriculum, and instructional and organizational approaches across three separate levels of schooling (middle, elementary, and high schools)...Capitalizing on continuity of schooling and introducing changes gradually (for example, increasing the number of specialized teachers with in-depth subject-matter expertise earlier than 6<sup>th</sup> grade) might not only serve students better, it might also provide more flexibility in hiring practices for districts. A school structure with more than a few grade levels might also increase the accountability of schools trying to address problems (for example, achievement gaps between certain demographic groups) before they escalate. (p. 116)

What is less obvious is whether the current research is deep enough to move policy and practice toward a return to a two level system. As Coladarci and Hancock (2002) mused, “The configuration of grades, in and of itself, probably *does* matter. The challenge for us is to become smarter about *why*” (p. 2). One of the issues that must be considered is the impact that the instructional organization of the school, in conjunction with its configuration, has on student achievement.

One delimitation of this study was its focus on a single grade level, grade 6. It was known that students in grade 6 could be found in schools with a variety of configurations, but primarily in K-6, K-8, or 6-8 settings in Florida. It was not known how each school organized instruction for their sixth grade students. Were sixth grade

students in K-6 and K-8 schools organized in self-contained classrooms and taught in much the same manner as the other elementary classrooms? Were they departmentalized, and if so, to what degree? Were they fully departmentalized with teachers certified by subject and taught using a middle school approach, incorporating any or all of the middle school concepts? Were sixth grade students in 6-8 middle schools taught in secondary organizational and instructional models much like that of a high school? Were they members of interdisciplinary teams with teachers who, to varying degrees, embraced and applied middle school concepts that balanced academic high standards with meeting the developmental needs of the young adolescent? Instructional organization is an issue that recurs in the literature, particularly as it relates to the practice of the middle school concept and its components - including interdisciplinary teaming, integrated curriculum, flexible scheduling, heterogeneous grouping, mentoring, and relationship building (George, 2009, p. 10).

### *Middle Schools and the Middle School Concept*

One of the complicating factors for educators as they consider whether the currently popular 6-8 middle school configuration is best for students is the degree to which implementation of the middle school concept impacts student achievement and success. Although much of the research presented in this study suggested that academic achievement falters in traditional middle school configurations, the question remains as to whether schools that implement middle school concepts wholly and with fidelity might demonstrate better results, with respect to both academic and non-academic outcomes. Non-academic outcomes studied would include factors such as attendance, discipline, and attitudes. “While there is substantial literature supporting the implementation of the



middle school concept, proving that middle schools are superior to other arrangements for educating young adolescents remains a significant challenge for educational researchers” (Anfara & Lipka, 2005, p. 1).

Based on their review of research, Juvonen et al. (2004) argued that poor academic performance in middle schools might partially be explained by their finding that “the implementation of the middle school concept has been less than adequate in most districts and schools” (p. 114). They continued:

Although some of the core practices, such as interdisciplinary team teaching and advisory programs, are found in middle schools, our reviews...indicated that they tend to be implemented weakly, with little attention to the underlying goals that the practices were designed to reach...It is reasonable to assume that a sufficient level of fidelity to many of the reform practices is not possible without substantial additional attention, resources, and support over the long run. (p. 114)

Juvonen et al. recommended moving away from middle schools, saying, “We strongly encourage evaluation of alternative models for middle grades – models that do not require multiple transitions, allow better coordination of goals across grades K-12, and can foster academic rigor as well as provide social support” (p. 19).

Weiss and Kipnes (2006), however, contended that policy- and decision-makers in districts should be wary of dismantling their middle schools based on conclusions such as those of Juvonen et al. They asserted that:

Seldom have these conclusions been drawn from direct comparisons between middle schools and other schooling forms, a limitation of research design that has led to a distorted picture of the impact of middle schools. As a result, current initiatives to reform or eliminate middle schools are being undertaken with an inadequate understanding of the middle school’s effects relative to those of alternative schooling forms. (p. 243)

McEwin, Dickinson and Jenkins (2003) advocated for the middle school configuration based on their survey of middle school administrators for the National Middle School Association. According to their findings, “The premise that young adolescents need and deserve a school devoted exclusively to their education and welfare is widely accepted by educators, policy makers, parents, and other stakeholders across the nation” (p. 2). Based on this, they averred:

Grade organization decisions should be driven by the developmental characteristics, needs, and interests of young adolescents rather than by expediency. When possible, middle schools should house grades 5-8 or 6-8. These grade levels should be included because they are the grades in which young adolescents are typically enrolled. Placing these youth in schools that focus directly and exclusively on their needs and interests increases the chance that they will be more successful learners during a challenging time of their development...Educators in separately organized middle schools do not have to divide their energies between two or more developmental age groups [as in K-6, K-8, or K-12 configurations]...When separately organized middle schools are not possible, steps should be taken to establish “middle schools within schools” so that programs and practices that benefit young adolescents can be implemented to the fullest extent possible. (p. 2)

Middle schools have had over a quarter of a century to prove their worth and to implement middle school concepts, and their success is being questioned. Paul George (2009), actively involved in leading the middle school movement in Florida for over 30 years, wrote in a special report for the Florida League of Middle Schools that “essential components of effective middle school programs have begun to disappear from the daily experience of educators and students in Florida middle level schools” (2009, p. 1).

Although his survey of Florida educational leaders revealed that principals and district administrators believed this diminution of the implementation of the core components of the middle school concept was primarily due to the current emphasis on testing and accountability, George believed that it may have been due to “serious inadequacies that

have accompanied the process of implementing middle schools in Florida, a process that began in the late 1960's and continued for the next three decades" (p. 9). He called it a "flawed process" (p. 9) that violated the three principles essential to implementing successful change: "clarity of mission, authentic commitment, and skillful execution" (O'Kelly as cited in George, 2009, p. 9). George wrote:

Effective execution of the core components of the exemplary middle school has been, from the beginning, less than fully satisfactory. When new middle school buildings have been opened in Florida, or when a new leader took the reins of an existing middle school, it is likely that the three elements critical to the success of the schools were, to some extent missing: clarity, commitment, and execution. Little wonder then, when this process plays out in the 21<sup>st</sup> century...program components associated with exemplary middle schools seem perilously close to collapse. (p. 10)

George (2009) called for a "newly emergent middle school concept" (p. 10) that applies the essential elements of change to create balanced middle school programs in which schools are "both accountable and developmentally responsive" (p. 10). These programs would lead to "success in the state's accountability program" and would "include those components associated with developmentally appropriate education of young adolescents" (p. 10). Accomplishing this "will require the sustained involvement of many stakeholders: public school educators, the FDOE, the Commissioner of Education, representatives of the state's colleges and universities, the Florida League of Middle Schools, [and] the Florida Association of School Administrators" (p. 11). He acknowledged the challenges inherent in this mission:

A task force representing all such stakeholders, with financial and political support might be able to create a model for a newly emergent middle school, and supply the energy required for the creation of the now-missing critical elements of middle level teacher/administrator certification and education. (p. 11)

George understood the implications for policy and practice of what he sought to accomplish. But he also asked the question, “Will it be possible to create such schools and construct the supportive systems needed to sustain them?” He optimistically answered, “We must!” (p. 11).

Anfara and Lipka (2003) also asked a fundamental question that has implications for policy and practice around the issue of whether the middle school can rise to the high standard of academic success required in the age of No Child Left Behind: “Does the middle school concept work?” (p. 32). They noted that “attempts to ascertain the relationship between middle level reform...and student achievement have yielded ambiguous and conflicting results” (p. 24).

We cannot lose sight of what the middle school concept is all about – the development of the whole child. As middle level advocates, policymakers, practitioners, and researchers we must reaffirm our commitment to the desired results of improved academic performance and socio-emotional growth...Student academic achievement, as defined and measured by standardized testing, may be our current emphasis (in response to the political context), but it cannot be gained at the expense of bypassing the needed debates regarding how to more broadly and holistically define and assess student achievement – be it in the realm of practice or research of middle level education. This definition is central to answering the question, “Does the middle school concept work?” (p. 32)

The answer to that question bears directly on policy and practice related to changes in grade level groupings. As educators make decisions about grade span configuration as a mechanism for improving student achievement, it is important that they understand how the success of the middle school is tied to the success of the middle school concept. They must decide whether they are willing and able to devote the resources required to reinventing the middle school to meet high expectations or whether it is time to let them go.

### *Beyond the Debate about Grade Configuration*

Although the findings of this study indicate that grade span configuration does make a difference in the academic achievement of young adolescents, the implications for policy and practice go beyond that narrow focus. The National Middle School Association said it quite succinctly: “Effective programs and practices, not grade configuration, determine the quality of schools” (NMSA Research Summary #1, n.d.). Beane and Lipka (2006) admonished “No matter which grade configuration school districts choose, the most important decision is what kind of education they will offer young adolescents (p. 29). They continued:

Rather than debate which grade configuration is best for the middle grades, we would be better off expending our energy creating a curriculum that intellectually engages and inspires young adolescents, pushing for organizing structures that support high-quality relationships, and finding better ways to reach out to families and communities. (p. 30)

McEwin (1983) expanded upon this idea, underscoring the importance of trained and committed teachers. “Much remains to be accomplished if quality learning experiences are to be available for all early adolescents. Unless many more teacher education institutions and certification agencies move more rapidly to provide trained and committed personnel, still another approach may have to be found in order for early adolescent schooling to survive and succeed” (p. 124).

Educational decision-makers should be implementing policy and practice in their schools and school systems that lead to better teaching and improved student achievement. Further research that clarifies the relationship between grade configuration and academic achievement in schools where teaching and learning are optimized should

bear significantly on how grade levels should be grouped for maximum impact on academic excellence.

Another factor often linked to discussions of the impact of grade configuration on student outcomes is the impact of the transitions between grade level groupings. Coladarci and Hancock (2002) summarized several significant studies on the effect of grade span configuration on academic achievement, including the work of Wihry, Coladarci and Meadow (1992), Becker (1987), Moore (1984), and Franklin and Glascock (1998). They discussed the implications of the research for schools and school systems, noting first that “the segregation of adolescents in middle-grade schools does not necessarily translate into higher achievement,” but that to be meaningful, further research must “take into consideration the instructional or interpersonal dimensions of school life” (p. 191). Second, they emphasize the importance highlighted by the research of providing students with “articulation and transition activities” because “teachers and students alike should have an informed view of the instructional and social world of the next school in line” (p. 191). Policy and practice should include activities and structures that help students through the transitions between grade level groupings.

Alspaugh (1998, 1999) also emphasized the negative effect of transitions between grade groupings on student achievement. He asserted that the findings of his research were “consistent with the findings of other researchers in that the instability and adjustments required of students in school transitions were associated with education outcomes” and that “the findings imply that students placed in relatively small cohort groups for long spans of time tend to experience more desirable educational outcomes” (Alspaugh, 1998, p. 25). His charge to educators, decision- and policy-makers is to

create school systems with a minimum number of transitions, preferably limited to one between primary and secondary schools.

Anfara and Schmid (2007) wrote that although transitions are indeed significant events in the academic and developmental lives of young adolescents, more research is necessary before changes to policy or practice are implemented. Weiss and Bearman argued that “the research that currently exists offers more theory and conjecture than rigorous evidence” (as cited in Anfara & Schmid, p. 66). Anfara and Schmid summarized the implications of research on transitions for middle level students, saying, “We urge practitioners and policymakers to consider best practices for transitioning. We also caution that best practices must be supported with effective and sufficient professional development and the necessary resources (both financial and personnel) to ensure successful implementation” (p. 66).

This study and those that should follow it may provide information to educational leaders, stakeholders, and decision-makers that can be useful in directing changes in policies and practices. These changes can help lead to optimized learning experiences, improved academic achievement, and a more developmentally appropriate learning environment for young adolescents. The research generally shows that a relationship exists between grade span configuration and the academic success of young adolescents. If rigorous research and evidence can link improved academic performance, as well as other positive indicators of school success, to grade configuration as distinguished by each school’s instructional and organizational approach, the implications for reforming middle level education would be significant.

## Conclusion

Overall, this study, both through the review of literature and the original research, supports the idea that grade span configuration does have an impact on the student achievement of early adolescents. This study measured the 2009 reading and mathematics performance of Florida schools with sixth grade students, using school mean scale scores and the percent of students performing at grade level and above on the Florida Comprehensive Assessment Test (FCAT) as the dependent variables. Socioeconomic status was used as a covariant to control for its effect on student achievement. The three most popular grade configurations in Florida that include grade 6 were used as the independent variables in the study: preschool/kindergarten through grade 6 (PK-6), preschool/kindergarten through grade 8 (PK-8), and grades 6 through 8. These three configurations comprised nearly 90% of the 869 schools for which FCAT scores and schools grades were available. The findings indicated that for both reading and mathematics, on both achievement variables, PK-6 schools performed significantly higher than 6-8 schools and outperformed PK-8 schools. PK-8 schools also had higher mean scores than 6-8 schools in all but one case. Schools with elementary configurations, particularly those with PK-6 configurations demonstrated higher mean achievement than middle schools.

Although the findings of this research are consistent with the overwhelming majority of other similar studies on the effect of grade span configuration on student achievement, the limitations of the study suggest the need for further research. That research should include the differences in achievement based on grade span configuration and on instructional organization, including the degree to which middle school concepts



are implemented and the degree to which transitional activities are provided. At some point, however, research should be translated into practice and decisions about configuring schools should be made to maximize learning opportunities for students.

APPENDIX A  
IRB REVIEW



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

### Not Human Subjects Research / Not Research

From : **UCF Institutional Review Board**  
FWA00000351, Exp. 10/8/11, IRB00001138

To : **Karen Schafer**

Date : **July 17, 2009**

IRB Number: **SBE-09-06334**

Study Title: **The Impact of Grade Configuration on Sixth Grade Academic Achievement of Public Schools in Florida**

Dear Researcher:

After reviewing the materials that you have submitted, the UCF Institutional Review Board has determined that your project, listed above, does not fit the definition of human subjects research. This is a doctoral dissertation that uses secondary data which is publically available. Therefore, IRB review is not needed.

Thank you for your time in resolving this issue. Please continue to submit applications or contact the IRB office when involved in research activities that could potentially involve human subjects as research participants.

On behalf of Sophia Dziegielewski, Ph.D., UCF IRB Vice-chair, this letter is signed by:

Signature applied by Janice Turchin on 07/17/2009 02:55:49 PM EDT

A handwritten signature in black ink that reads 'Janice Turchin'.

IRB Coordinator

APPENDIX B  
SUMMARY OF GRADE CONFIGURATION RESEARCH LITERATURE

Researcher	Year	Location	Focus	Findings	Other	
<a href="#">Abella</a>	2005	Miami-Dade students	Gr 6 RM in K-8 vs 6-8	Performance of students over time (gr. 6-9)	K-8 stud. Had signif. short-term achievement benefits (& attendance, suspension rates: Identical scores by gr. 9)	Did not control for any factors
<a href="#">Alspaugh</a>	1998	Missouri	GR 6 R, M, S, SS	48 districts	Students in K-8 to 9-12 do best, linear E, MS, HS next best, pyramid E, M, H worst	Studied effect of # of transitions on achievement;
<a href="#">Becker</a>	1987	Pennsylvania schools	Gr 6 R, M, S, SS	330 schools 8000 stud Elem vs MS	Higher student ach in elem schools in all subjects tested	Results dependent on SES: Elementary advantage highest for low SES; declines as SES increases
<a href="#">Bedard &amp; Do</a>	2005		Gr. 6		Used NCES data: when districts move from elem syst to MS, there is a 1-3% drop in OT graduation	Economists: focused on economic impact of on-time graduation
<a href="#">Collins</a>	2006	NC	Gr 6 RM All stud and subgr	K-8 vs 6-8 60 schools	K-8 higher scores on NC exam; 6-8 stud score lower for at least a yr following transition	Differences in ach disappear over 3 years for all groups and subgroups
<a href="#">Cook et al</a>	2008	NC	Gr 6 RM	K-6 vs 6-8	K-6 higher scores on NC exam, half as likely to have disciplinary infractions	Controlled for SES: issue with negative results of exposing 6 <sup>th</sup> grade students to older peers; need research on K-8
<a href="#">Dove</a>	2007	Ark	Gr 6 RM 3yr	Schools in 3 groups: 281 schools	<i>Found no relationship between GSC and RM scores on Ark exam</i>	Group 1: P/K/1-6; group 2: 6, 6-7, 6-8; Group 3: 5-6, 5-7, 5-8
<a href="#">Edds</a>	2006	Calif	Gr 6 RM	15 schools; 5 ea K-6, K-8, 6-8	K-8 higher stud ach and lower susp rates; 6-8 lower ach than either K-6 or 8	
<a href="#">Franklin &amp; Glascock</a>	1998	Rural sch in LA	Gr. 6, 7 in K-6, K-7, K-12, 6-8, 7-9	700 schools	6 <sup>th</sup> and 7 <sup>th</sup> gr. Stud perf sig higher on state ach tests in gr. K-6, K-7, K-12 than in 6-8, 7-9	Control for sch size and SES
<a href="#">Hough</a>	2004				K-8 schools outperform MS when implementing MS philosophy	"Elemiddle" schools (K-8) preferable- provide transition exp for gr 6
<a href="#">Moore</a>	1984	NYC students	7, 8 RM in 9 K-8 vs 9 6-8	Perf of students	K-8 stud perf sig higher in R, higher in M, (increased attendance, higher self esteem)	Schools matched for 6 <sup>th</sup> gr. Ach., ethn, and SES
<a href="#">Rickles, White</a>	2005	Los Angeles	Gr. 6	K-6 vs 6-8	Ach gains sig higher for gr 6 in K-6 than MS, but diminish when students move to MS	Follow-up study to 2 prev. studies; used Cal School Characteristics Index to control for SES
<a href="#">Tucker &amp; Andrada</a>	1997	Conn	Gr 6 RMW	K-6 vs 6-8 schools	K-6 outperformed 6-8 in all subjects: K-6 accountable for gr. 6, 6-8 was not	Effect of accountability
<a href="#">Vaccaro</a>	2000	Tenn	Gr 6, 7, 8 RMS over 3 yr	K-8 vs 6-8	Gr 6,7 stud did best in K-8 schls; Gr 8 stud did equally well on Tenn exam	Examined academic gains and achievement
<a href="#">Whitely, Lupart, Beran</a>	2007	Canada	Gr. 6	K-8 vs 6-8	Found no difference in ach	Ach not measured on std scale: used self-reported teacher parent and stud reports
<a href="#">Wihry, et al</a>	1992	Maine schools	Gr 8 RM	163 schools E: K-8, 9, 3-8 M: 4-8, 5-8, 6-8 J: 7-8, 7-9 H: 6-12, 7-12, 8-12	R: Gr 8 schools w/ stud in Elem (K-8, K-9, 3-8) sig higher ach on State ach test than MS which was higher than HS; less so for math	Control for SES, sch size, pupil/staff ratio, teacher ed, teacher exp: SES had most sig impact on student scores SES: scores incr 5 points for every 1% measure of affluence
<a href="#">Yeche</a>	2006	Milwaukee, Baltimore,	6, 7, 8	K-8 vs K-5,6 who	K-8 school outperformed MS and stand ach tests	Research from several city districts w/ K-8; recommends transitioning gr

APPENDIX C  
NUMBER OF SCHOOLS WITH GRADE 6  
FOR ALL GRADE SPAN CONFIGURATIONS

	Number of all schools w/ grade 6 (from MSID*)	Number of grade 6 schools w/ matched records
6-8	544	529
PK-6	146	130
6-12	131	26
PK-8	115	106
PK-12	66	12
6-11	27	1
5-8	16	12
5-12	11	1
6-9	11	7
PK-7	11	9
2-12	8	1
6	7	7
4-8	7	4
4-12	7	1
3-8	6	4
6-7	5	5
6-10	5	1
3-12	3	0
4-6	2	2
5-11	2	0
PK-10	2	1
PK-11	2	0
2-6	1	0
2-8	1	1
2-11	1	0
3-11	1	0
4-7	1	1
5-9	1	0
5-10	1	0
Non-consecutive total	71	8
	1212	869

\*FLDOE Master School Identification File

APPENDIX D  
NUMBER AND PERCENT OF SCHOOLS WITH GRADE 6  
FOR MOST POPULAR GRADE SPAN CONFIGURATIONS



	Gr 6: # of ALL schools w/ 6th grade	% of total	Gr 6 # of schools w/ matched records	% of total	Decline in # schools after matching records
PK-6	146	12%	130	15%	16
6-8	544	45%	529	61%	15
PK-8	115	9%	106	12%	9
5-8	16	1%	12	1%	4
PK-12	66	5%	12	1%	54
Other	194	16%	54	6%	140
6-12	131	11%	26	3%	105
	1212	100%	869	100%	

APPENDIX E  
ACADEMICALLY HIGH PERFORMING DISTRICTS  
ELIGIBILITY STATUS

## **Academically High-Performing School Districts 2008-09 Eligibility Status**

Chapter 2007-194, Laws of Florida (Section 1003.621, F.S.)

Section 1003.621, F.S., states it is the intent of the Legislature to recognize and reward school districts that demonstrate the ability to consistently maintain or improve their high-performing status. School districts that satisfy the eligibility criteria and receive the academically high performing designation are provided flexibility in meeting specified requirements in statute and rules of the State Board of Education.

The 14 school districts listed in Table 1 have met the eligibility criteria specified in statute for designation as academically high performing school districts in 2008-09. Seven of the 14 school districts were initially designated Academically High Performing by the State Board of Education in 2006-07 and are maintaining their third year of designation. Two school districts were initially designated Academically High Performing in 2007-08 and are maintaining their second year of designation. Five school districts are being presented to the State Board for first-year designation.

School districts included on the list have, in the most recent year for which school grades are available, met the two academic criteria required by s. 1003.621, F.S.:

- Beginning with the 2004-2005 school year, earned a grade of "A" under s. 1008.34(7), F.S., for 2 consecutive years; and
- Has no district-operated school that earned a grade of "F" in the most recent grading period under s. 1008.34, F.S.

Each of the school districts has also met the additional requirements for designation as an academically high performing school district:

- Class size compliance – This column records whether the district complies with all class size requirements in s. 1, Art. IX of the State Constitution and s. 1003.03, F.S., in the most recent year for which class size was calculated. Eligibility is based on 2008-2009 class size data, including adjustments to compliance made as a result of the appeals process.
- Audit compliance – This column records whether the district has no material weaknesses or instances of material noncompliance noted in the most recent annual financial audit conducted pursuant to s. 218.39, F.S.

APPENDIX F  
2008-09 ACADEMICALLY HIGH PERFORMING DISTRICTS

**Academically High-Performing School Districts  
2008-09 Eligibility Status**

SCHOOL DISTRICT	DESIGNATED ACADEMICALLY HIGH PERFORMING DISTRICT		DISTRICT GRADED "A" FOR TWO CONSECUTIVE YEARS		DISTRICT OPERATED "F" SCHOOLS IN MOST RECENT YEAR	COMPLIES WITH CLASS SIZE REQUIREMENTS	AUDIT FINDINGS	
	2006-07	2007-08	2006-07	2007-08	2007-08	2008-09	Finding	Year Ended
Alachua			A	A	0	Yes	No material noncompliance; no material weakness; unqualified audit opinion.	06/30/07
Calhoun	Yes	Yes	A	A	0	Yes	No material noncompliance; no material weakness; unqualified audit opinion.	06/30/08
Charlotte	Yes	Yes	A	A	0	Yes	Unqualified audit opinion; no material weakness; no material noncompliance.	06/30/07
Citrus			A	A	0	Yes	No material noncompliance; no material weakness; unqualified audit opinion.	06/30/07
Clay			A	A	0	Yes	No material noncompliance; no material weakness; unqualified audit opinion.	06/30/07
Gilchrist	Yes	Yes	A	A	0	Yes	No material noncompliance; no material weakness; unqualified audit opinion.	06/30/08
Leon			A	A	0	Yes	No material noncompliance; no material weakness; unqualified audit opinion.	06/30/07
Martin	Yes	Yes	A	A	0	Yes	No material noncompliance; no material weakness; unqualified audit opinion.	06/30/08
Nassau	Yes	Yes	A	A	0	Yes	No material noncompliance; no material weakness; unqualified audit opinion.	06/30/08
Okaloosa	Yes		A	A	0	Yes	No material noncompliance; no material weakness; unqualified audit opinion.	06/30/07
St. Johns	Yes	Yes	A	A	0	Yes	No material noncompliance; no material weakness; unqualified audit opinion.	06/30/07
Seminole		Yes	A	A	0	Yes	No material noncompliance; no material weakness; unqualified audit opinion.	06/30/08
Wakulla		Yes	A	A	0	Yes	No material noncompliance; no material weakness; unqualified audit opinion.	06/30/07
Walton	Yes	Yes	A	A	0	Yes	No material noncompliance; no material weakness; unqualified audit opinion.	06/30/07

\*Grades: Charter school student performance is used in calculating the district letter grade; however, since individual charter schools are not district operated, their grades are not used in criterion related to "F" schools.

\*\*Class Size Compliance: Data are post-appeals and reflect adjustments to compliance based on appeals.

\*\*\*Audit Findings: An Academically High Performing School District is required to have no material weaknesses or instances of material noncompliance noted in its annual financial audit in the initial year and each subsequent year of eligibility. Because charter schools undergo separate audits under Section 218.39, F.S., the audit requirement only applies to the school district's audit.

Brevard Public Schools was added to the list of Academically High Performing Districts after publication of the original document..

SCHOOL DISTRICT	DISTRICT GRADED "A" FOR TWO CONSECUTIVE YEARS		DISTRICT OPERATED "F" SCHOOLS IN MOST RECENT YEAR	DISTRICT COMPLIES WITH CLASS SIZE REQUIREMENTS	MOST RECENT FINANCIAL AUDIT FINDINGS		DISTRICT PREVIOUSLY DESIGNATED ACADEMICALLY HIGH PERFORMING	
	2006-07	2007-08	2007-08	2008-09	Finding	Year Ended	2006-07	2007-08
Brevard	A	A	0	Yes	No material noncompliance; no material weakness; unqualified audit opinion.	06/30/08	No	Yes

APPENDIX G  
SUMMARY OF STATISTICS FOR SAMPLES TAKEN FROM  
ALL FLORIDA SCHOOLS WITH SIXTH GRADE BY HYPOTHESIS NUMBER

	#1 Reading Mean Scale Score	#2 Math Mean Scale Score	#3 Reading Mean % with Lrng Gains	#4 Math Mean % with Lrng Gains
Statistical Test	ANOVA	ANCOVA	ANCOVA	ANCOVA
Statistical Significance	Yes p<.01	Yes p<.01	Yes p<.01	Yes p<.01
Practical Significance	Config: 7% low to moderate	Config: 17% moderate to high SES: 50% very high	Config: 16% moderate to high SES: 22% high	Config: 26% high SES: 12% moderate
PK-6 mean	324	331	76%	69%
PK-8 mean	317	314	71%	57%
6-8 mean	310	316	68%	52%
PK6 vs PK8 sig. difference	Yes p=.048	Yes p=.000	Yes p=.000	Yes p=.000
PK6 vs 6/8 sig. difference	Yes p=.000	Yes p=.000	Yes p=.000	Yes p=.000
PK8 vs 6/8 sig. difference	Yes p=.044	No p=.448	Yes p=.002	Yes p=.002

APPENDIX H  
SUMMARY OF STATISTICS FOR SAMPLES TAKEN FROM FLORIDA  
SCHOOLS IN ACADEMICALLY HIGH PERFORMING DISTRICTS BY  
HYPOTHESIS NUMBER



	#5 Reading Mean Scale Score	#6 Math Mean Scale Score	#7 Reading Mean % with Lrng Gains	#8 Math Mean % with Lrng Gains
Statistical Test	ANOVA	ANOVA	ANOVA	ANOVA
Statistical Significance	Yes p<.01	Yes p<.01	Yes p<.01	Yes p<.01
Practical Significance	Config: 6% low	Config: 12% moderate	Config: 23% high	Config: 33% very high
PK-6	331	339	77%	71%
PK-8	323	325	71%	63%
6-8	321	324	69%	53%
PK6 vs PK8 sig. difference	No	No	No	No
PK6 vs 6/8 sig. difference	Yes	Yes	Yes	Yes
PK8 vs 6/8 sig. difference	No	No	No	No

APPENDIX I  
SUMMARY OF MEANS

*Mean Scores for Each Dependent Variable by Grade Configuration for Sample from All Schools in Florida*

	Mean Reading Scale Score	Mean Math Scale Score	Mean % with Reading Gains	Mean % with Math Gains
PK-6	324	331	76%	69%
PK-8	317	314	71%	57%
6-8	310	316	68%	52%

*Mean Scores for Each Dependent Variable by Grade Configuration for Samples from Academically High Performing Districts*

	Mean Reading Scale Score	Mean Math Scale Score	Mean % with Reading Gains	Mean % with Math Gains
PK-6	331	339	77%	71%
PK-8	323	325	71%	63%
6-8	321	324	69%	53%

*Difference in Mean Scores for Each Dependent Variable by Grade Configuration for Samples from All Schools and Academically High Performing Districts*

	Mean Reading Scale Score	Mean Math Scale Score	Mean % with Reading Gains	Mean % with Math Gains
PK-6	+7	+8	+0.01	+0.02
PK-8	+6	+11	0	+0.06
6-8	+11	+8	+0.01	+0.01

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