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The Influence of Instructional Minutes on Grade 11 Language Arts and Mathematics High
School Proficiency Assessment Performance

Simone E. Welcome

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Submitted in partial fulfillment of the
Requirements for the degree of
Doctor of Education

Seton Hall University

May 2017

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SETON HALL UNIVERSITY
COLLEGE OF EDUCATION AND HUMAN SERVICES
OFFICE OF GRADUATE STUDIES

APPROVAL FOR SUCCESSFUL DEFENSE

Simone E. Welcome, has successfully defended and made the required modifications to the text of the doctoral dissertation for the **Ed.D.** during this **Spring Semester 2017**.

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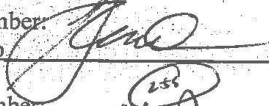
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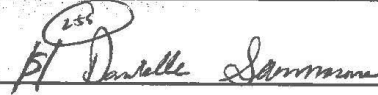
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3/21/17

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ABSTRACT

The purpose for this cross-sectional, non-experimental explanatory quantitative research study was to explain the amount of variance in the High School Proficiency Assessment-11 Language Arts and Mathematics scores accounted for by the amount of instructional minutes at high schools in New Jersey. A proportional, stratified random sample which included all public high schools' students who participated in the State of New Jersey was generated and subsequently analyzed to determine the influence of NJ School Report Card-instructional minutes on NJ HSPA-11 language arts and mathematics scores.

The independent variable was instructional time, which is defined as the exact amount of time a school dedicates to instruction during a normal school day controlling for student, faculty and school variables. The student variables included attendance, mobility, LEP, students with disabilities and socioeconomic status. The faculty variable included attendance, credentials and mobility. School variables included school size and length of school day.

Total instructional time, the focus of this study, was not a statistically significant predictor of student achievement in the grade 11, 2011 High School Proficiency Assessment for Language Arts and Mathematics. The variable that was the most significant predictor of student achievement in the grade 11, 2011 High School Proficiency Assessment for Language Arts and Mathematics was Limited English Proficiency (LEP) students. Other variables that were found to be statistically significant predictors of student achievement included student mobility, students with disabilities, SES, and student attendance, along with the faculty-based variables faculty attendance and faculty mobility as well as the school-based variable school size for students on the grade 11, 2011 High School Proficiency Assessment for Language Arts and Mathematics.

Keywords: instructional minutes, NJ HSPA, proficiency levels, socioeconomic status, LEP

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DEDICATION

To my guardian angel and grandmother, Diana Agatha Welcome, this dissertation is dedicated to you. Although you were not here to experience all of this with me, I know you are watching over me from the heavens. I hear your voice in my head and heart all the time, and it helps me continue to smile and do better.

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“It always seems impossible until it is done.”

Nelson Mandela

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CHAPTER ONE

INTRODUCTION

Background

One goal of education is to provide students with the knowledge and skills necessary to drive their own life-long learning and perform well in life. “Over the last 20 years, there has been an explosion in the use of ‘indicators’ by policymakers. Indicators are a labelled collection of data that can be used to compare institutions, such as schools or school systems, to agreed-upon, pre-set standards” (Espeland & Stevens, 2008). When indicators are used to set standards, or measure progress towards a standard, they embed within them ideas about the nature of success (Davis, Kingsbury, & Merry, 2011). In the United States, standardized tests have become the ubiquitous, pressure-packed criterion (Fletcher, 2009) used to connote success.

As early as 7th century Imperial China up to 1898, standardized tests have been used to assess knowledge (Matthews, 2006). The tests were created from a rigid “eight-legged essay” format and tested the government job applicants’ memorized comprehension of Confucian philosophy (Crozier, 2002). The years following the Industrial Revolution propagated numerous inventions that made work easier and cheaper. As these inventions created new manufacturing and industry, many people also moved away from farms into cities. Large groups of students were able to be tested because of standardized assessments (Haney, 2006).

School reformers Horace Mann and Samuel Gridley Howe made current the use of standardized testing in Boston schools by the mid-1800’s. The intent of this assessment was to provide a "single standard by which to judge and compare the output of each school." This

assessment also aimed to assemble unbiased information about teaching quality. This approach was soon being used by school systems nationwide (Phelps, 2007). In light of this progression of assessment, concerns about excessive testing were voiced as early as 1906. The New York State Department of Education advised the state legislature that "it is a very great and more serious evil to sacrifice systematic instruction and a comprehensive view of the subject for the scrappy and unrelated knowledge gained by students who are persistently drilled in the mere answering of questions issued by the Education Department or other governing bodies" (Nichols & Berliner, 2007). In 1934, International Business Machines Corporation (IBM) hired a teacher and inventor named Reynold B. Johnson (best known for creating the world's first commercial computer disk drive) to create a production model of his prototype test scoring machine (IBM, 2016). The IBM 805, announced in 1938 and marketed until 1963, graded answer sheets by detecting the electrical current flowing through graphite pencil marks (Fisher, 1998). The ease of gathering results using these types of machines added to the use of standardized assessments.

The Kansas Silent Reading Test (1914-1915), the earliest known published multiple-choice test, was developed by Frederick J. Kelly, a Kansas school director who supported standardization and testing. This multiple choice test was meant to reduce "time and effort" in administration and scoring (Zimmerman & Schunk, 2002). Within the same period of time, the U.S. military began using multiple choice aptitude tests during World War I to screen people for service and to assign new recruits to military occupations. Between 1917 and 1918, the Army Alpha and Army Beta tests were developed so that military commanders could have some measure of the ability of their men (Waters, 1997). The Army Alpha test was a verbal, group-administered test that measured verbal ability, numerical ability, ability to follow directions, and information. The Army Beta was a non-verbal, group-administered counterpart to the Army

Alpha. It was used to evaluate the aptitude of illiterate, unschooled, or non-English speaking draftees (Yerkes, 1921). These objectives of identifying and categorizing groups of people would influence the evolution of student assessment.

The Elementary and Secondary Education Act (ESEA), instituted by President Lyndon Johnson in 1965, put into action testing and accountability plans in an attempt to raise the bar and make education more proportional to the large population of students (Nichols & Berliner, 2007). The 1983 release of *A Nation at Risk: The Imperative for Educational Reform* (USDOE), a report by President Ronald Reagan's National Commission on Excellence in Education, criticized the decreasing competence and quality of American education. *A Nation at Risk* warned of a crisis in American education and an urgent need to raise academic standards (Sacks, 2001). The report described the education system as having "lost sight of the basic purposes of schooling, and of the high expectations and disciplined effort needed to attain them" and emboldened reform advocates to seek exacting accountability criteria, including more assessments (National Commission on Excellence in Education, 1983). The upcoming administrations tried to invoke national school reform following the publication of *A Nation at Risk's*. George H.W. Bush's *America 2000* plan (USDOE, 1991), sought to attain the world's best math and science test scores by the turn of the century, but got caught up in Congress (Kosar, 2003). Bill Clinton's *Goals 2000 Act* and *Improving America's Schools Act* (IASA), both passed in 1994, establishing a voluntary system of testing and accountability, however not many states participated. Clinton's 1997 *Voluntary National Test* initiative weakened in Congress and was dissipated after \$15 million and over two years had been spent on its creation (Bourque, 2005).

The No Child Left Behind Act (NCLB) was signed into law by President George W. Bush on Jan. 8, 2002 (USDOE, 2002). This legislation authorized annual testing in reading, math

and later science, in Grades 3 through 8 and again in the 10th Grade (Bourque, 2005). Schools encountered sanctions if they did not show acceptable "Adequate Yearly Progress" (AYP), along with the risk of being taken over by the state or closed (Barth, 2006). While seen as an impossible goal by a large amount of testing opponents, NCLB required that 100% of US students be "proficient" on state reading and math tests by 2014" (Hess, 2007). According to the Pew Center on the States, "annual state spending on standardized tests rose from \$423 million before NCLB to almost \$1.1 billion in 2008 (a 160% increase compared to a 19.22% increase in inflation over the same period)" (Vu, 2008). On February 17, 2009, President Obama signed into law the *American Recovery and Reinvestment Act of 2009* (ARRA), a historic legislation that was designed to stimulate the economy, support job creation, and invest in critical sectors, including education (USDOE, 2009). The ARRA provided \$4.35 billion for the *Race to the Top Fund*, a competitive grant program designed to encourage and reward states that created the conditions for education innovation and reform. Participating states that achieved significant improvement in student outcomes, including making substantial gains in student achievement, closing achievement gaps, improving high school graduation rates, and ensured student preparation for success in college and careers, competed for this funding (USDOE, 2010). On March 13, 2010, President Obama reconstructed the *No Child Left Behind Act* with *The Reauthorization of the Elementary and Secondary Education Act*. The ESEA provided additional impetus which promised further encouragements to states if they created improved assessments aligned to state standards and focused on other variables such as pupil attendance, graduation rates and learning climate in addition to test scores (Dillon, 2010). Both initiatives have been condemned for their ongoing dependence on test results, a complaint Obama even seemed to reverberate on March 28, 2011, when he said: "Too often what we have been doing is using

these tests to punish students or to, in some cases, punish schools” (Werner, 2011). On December 10, 2015 the *Every Student Succeeds Act* (ESSA) was signed by President Obama, reauthorizing the 50-year-old *Elementary and Secondary Education Act of 1965* (ESEA), the national education law. The stated objective of the ESSA is to build upon the critical work that states and local educational agencies have implemented over the last few years. State-developed accountability systems will be able to set target limits on the aggregate amount of time that students spend taking assessments for each grade and will set their own goals for proficiency (USDOE, 2016).

Testing Time

Within the educational environment, assessments are important because they identify areas in need of improvement. Having evaluated the results, interventions can be instituted to increase achievement. As schools across the country struggle to meet the demands of the federal No Child Left Behind Act and their state accountability systems, educators are searching for ways to raise student achievement. Rising numbers of school and district leaders are turning to one of the most fundamental features of the public education system: the amount of time students spend in school (Silva, 2007). Early on in our country’s history, public school schedules varied considerably by locality, with some schools opening nearly year round and others open only intermittently (Gold, 2002). In large cities, long school calendars were not uncommon during the 19th century. In 1840, the school systems in Buffalo, Detroit, and Philadelphia were open between 251 and 260 days of the year (Weiss & Brown, 2003). New York City schools were open nearly year round during that period, with only a three-week break in August (Johnson & Spradlin, 2007). This break was gradually extended, mostly as a result of an emerging elite class

of families who sought to escape the oppressive summer heat of the city and who advocated that children needed to “rest their minds.” By 1889, many cities had moved to observe the two-month summer holiday of July and August (Weiss & Brown, 2003). Rural communities generally had the shortest calendars, designed to allow children to assist with family farm work, but they began to extend their school hours and calendars as the urban schools shortened theirs. By 1900, the nation’s schools were open an average of 144 days, but, with many youth in the workforce and few compulsory attendance laws for school, students attended an average of only 99 of those days (Tyack & Cuban, 1995). School schedules underwent more adjustment during the 20th century to accommodate a changing population and the needs of war. Summer sessions were provided in some communities to teach English to immigrant students or to provide accelerated programs to allow students to graduate early, but most programs were used to manage a growing youth population and prepare a workforce.

Extended Day

The first extended-day schools emerged during World War II to provide care for the school-aged children of women who had to enter the workforce in order to support their families. By the 1960s, most schools in the country had settled on a schedule of 170–180 days, five days a week, six and a half hours a day (Silva, 2007). This has remained the standard in American public schools since then. A 2004 survey by the Council of Chief States School Officers found that 35 states required the school year to be 180 days or longer, and six required between 175 and 179 days. States and school districts around the country are considering dozens of proposals for extending the school day and the school year, ranging from lengthening the school day by several hours to extending the school year by days, weeks or months. A review of research on

extended day and extended year programs concluded a neutral to small positive effect on academic achievement could be expected. Due to scarce rigorous evaluation “the effect of [extended day programs] has yet to be fairly tested using well-controlled experimental or quasi-experimental designs from which strong causal implications could be drawn (Patall et al.,2010). In spite of these research findings, thirty-four states require five or more instructional hours per day (or no less than 900 hours per year) (Cavell, 2005). Recent years have seen Minnesota’s school superintendent propose increasing the school year from 175 to 200 days in 2004 (Brandt & Wascoe, 2005). A business-led group in Delaware proposed state funding for an additional 140 school hours a year as a part of its plan for improving the state’s education system (Vision 2015, 2012). Philadelphia schools chief executive Paul Vallas announced plans to extend the school year by about a month to ten and a half months (Graham, 2009). Chicago’s former mayor Richard Daley has called for year-round schools, while a group of Illinois legislators proposed extending the school year throughout the state (Speilman, 2005). New Mexico’s former governor Bill Richardson, proposed a longer school day and year for low-performing schools, while Washington, D.C. Superintendent Clifford Janey proposed a longer school year for low-performing schools in the nation’s capital (Haynes, 2006). Massachusetts lawmakers included \$6.5 million in the state budget to support a public–private partnership to expand learning time for 10 schools in five districts (Mooney, 2006). This call for policy change also includes New Jersey governor, Chris Christie’s Education *Innovation Fund* which aims to “pilot a \$5 million “grant-style” program for some school districts to study ways to implement longer hours” (Johnson, 2014).

Instructional Time

The purported intentions of these entreaties for policy changes, most specifically an extension of the school day or the school year, are increased student achievement. According to the Gallup Poll, the American public has traditionally opposed or been evenly divided on this notion; with a 2006 poll resulting in 48% in favor and 49% opposed (Rose & Gallup, 2006). Skeptics argue that increasing the number of days in the school year or number of hours in the school day will not necessarily translate to increased instructional time and increased time in which students are engaged in learning (Aronson et al., 1999; Karweit, 1985; Levin, 1984; Silva, 2007). Some have even dismissed the results of research on instructional time as ideology, not research (McNamara, 1981). However, not all time spent in school is equal because not all school and classroom time is devoted to formal instruction or learning. School time is spent on lunch, assemblies, traveling between classes, announcements, and the many other activities included in a regular school day. One can think of school time as being comprised of different “types” of time, the largest is allocated school time, followed by allocated class time, instructional time, then academic learning/ engaged time/ time-on-task. Allocated school time is the amount of time spent in school. When used this way, allocated school time may refer to the number of school days in a year or the number of hours in a school day (i.e., including lunch, recess, time spent changing classes, etc.) (Fisher, 2009). Allocated class times are the hours that students are required to be in the school and classroom (Anderson, 1983). Instructional time is the time devoted to teaching students particular knowledge, concepts, and skills pertaining to school subjects (i.e., excludes routine procedural matters, transitions, and discipline) (Bloom, 1976). Engaged time or Time-On-Task, refers to the portions of time during which students are

paying attention to a learning task and attempting to learn. This excludes time spent socializing, daydreaming, engaging in antisocial behavior, etc. A similar term is Academic Learning Time, which is a concept that came from the large-scale research effort called the *Beginning Teacher Evaluation Study* (BTES) conducted in the 1970s. Academic Learning Time refers to that portion of engaged time that students spend working on tasks at an appropriate level of difficulty for them and experiencing high levels of success (excludes time spent engaged in tasks which are too easy or too difficult) (Cotton, 1989).

While the distinctions may seem obvious, they are important because they make clear why any extended time proposal must focus on providing the right kind of time, i.e., instructional time and academic learning time, rather than just adding days and hours in general. A consortium on Chicago School Research time-use study reported that a great deal of classroom time is lost to startup routines, unnecessary interruptions, test preparation and poor classroom management. A typical school day in Chicago's public schools delivered fewer than 240 minutes of total instruction each day, far short of the 300 minutes of daily instruction mandated by the state (Smith, 1998).

Students who are allocated more school time have outcomes only slightly better than students who receive less. But the correlation between time and achievement increases when students are given more instructional time, and it is even greater when students' academic learning time increases (Silva, 2007). Specific educational time factors became a noted variable in student achievement with the landmark 1963 article by John B. Carroll entitled, "A Model of School Learning," in which degrees of learning were defined as the time actually *spent* in learning divided by time actually *needed* for learning. According to Carroll's model, the time needed for a given student to learn a given concept depends upon five factors: Aptitude; the

amount of time an individual needs to learn a given task under optimal instructional conditions. Ability; the capacity to understand instruction. Perseverance; the amount of time the individual is willing to engage actively in learning. Opportunity to Learn; the time allowed for learning. Quality of Instruction; the degree to which instruction is presented so as not to require additional time for mastery beyond that required by the aptitude of the learner. Carroll's work is widely regarded as the beginning of modern inquiry into the effects of time factors in the learning process.

Quantity vs. Quality

Theoretical models of time-learning relationships were furthered by researchers examining *The Beginning Teacher Evaluation Study* (BTES), a federally commissioned education study of teacher behaviors and competencies and carried out in three phases during the 1970s, which found that student achievement was most highly associated with instruction that engaged students and was aligned with students' abilities and preparedness (Fisher, 1978). Additional research over the last 25 years has supported those findings. Nancy Karweit and Robert Slavin, in their 1981 study, *Measurement and Modeling Choices in Studies of Time and Learning* used similar terminology, differentiating between scheduled time (the number of minutes per week supplied for math instruction), instructional time (scheduled time minus time lost to intrusion, procedure and inattention), and engaged time (similar to academic learning time) (Karweit & Slavin, 1981). They found that increased engaged time positively affected post-test scores, but increased scheduled time and instructional time had no effect on post-test scores. The Northwest Regional Educational Laboratory conducted one of the most comprehensive reviews of time-in-school research in 1989. Over fifty studies were analyzed on the relationship between time and learning, of which, 30 studies were identified that measured

the relationship between allocated time and student outcomes. A strong positive relationship between academic learning time and student achievement in one subset of 11 studies that examined the effects of academic learning time was found. However, no statistically significant relationship was found between allocated time and student achievement (Cotton, 1989). A decade later in 1998, researchers from a nonprofit research firm and one of the regional educational laboratories of the U.S. Department of Education, came to the same conclusion. In reviewing all available research on time and learning, it was concluded that there is little or no relationship between allocated time and student achievement, some relationship between instructional time and achievement, and a larger relationship between academic learning time and achievement (Aronson, 1998). “Any addition to allocated education time,” the authors write, “will only improve achievement” if it is used for instructional time that is used effectively enough to engage students (Aronson, 1998).

The length of the school day has long been correlated with student achievement, although recent research has underlined the role of time on task as the foundation of this, as longer school days characterized by poor instructional methods is not advantageous over shorter school days with superior instructional methods (Patall, Cooper & Allen, 2010).

In accordance with No Child Left Behind, the New Jersey State Legislature passed law 18A: 7C-6.2 in 1988, mandating that all students who graduate from a public high school in New Jersey must demonstrate the mastery of skills “...needed to function politically, economically, and socially in a democratic society” (NJDOE). These skills are defined within the Core Curriculum Content Standards in the realms of language arts literacy in addition to mathematics. The HSPA is meant to test whether or not the knowledge and skills identified within the CCCS are being gained, and to what degree. The level of progress measured by the HSPA in turn

determines whether or not the student graduates from high school (“Your Guide to the HSPA”, 2012).

The HSPA and its inherent test passages and items are developed and reviewed by state-level committees for mathematics, language arts, and sensitivity prior to their inclusion in the test. The committee review process includes the participation of New Jersey teachers and other educators. Prior to inclusion on the graduation test, all test passages and items are put through a rigorous field test. Proficiency levels are what determine the degree of achievement. These proficiency levels were determined in 2002 through the recommendations of experienced educators based upon 2002 test performance. Through an assessment of these recommendations in addition to the Commissioner of Education, the State Board of Education instituted the proficiency standards by which the HSPA is measured (“Your Guide to the HSPA”, 2012).

Upon having taken the NJ HSPA, the student receives an Individual Student Report, or ISR, containing their scores in mathematics and language arts literacy. Each section of the test receives a total scale score, as well as raw scores for each reporting cluster. Scores are reported in three proficiency levels, those of advanced proficient, proficient, and partially proficient. Advanced proficient and proficient students pass, those that are found to be partially proficient fail. Should a student fail they are presented with two additional opportunities in their senior year to take the exam again, having only to take those sections that have yet to be passed. Students who have failed must be provided with remedial instruction that is targeted to their individual needs. Should a student be unable to pass the HSPA, the AHSA is presented, the Alternative High School Assessment process. In the event the student is unable to pass this, they must pass the test of General Educational Development, GED, or otherwise not receive a high-school diploma (“Your Guide to the HSPA”, 2012). Student achievement, as due to such tests

been largely standardized, with the means of measurement bringing rise to scrutiny over the variables that impact the results, including instructional time.

In the modern environment, Wang (2011) has again underscored the relationship between time on task and achievement, finding this to be influential even in online classroom activities given their time on task relativity. Substantial research has highlighted the link between student achievement and time (Scheerens & Bosker, 1997; Marzano, 2007), however the impact of instructional minutes, in particular, has not been comprehensively studied. Downey (2012) would find that increasing instructional minutes served as a strength that improved upon satisfaction among students and teachers. The benefits of focusing upon instructional time have been further underlined by Mandel and Sussmuth (2011), who found that instructional time is a variable upon student achievement that may in fact be affected by policy in the short run. In light of this correlation, this study investigated the influence of instructional minutes upon the New Jersey High School Proficiency Assessment.

Statement of the Problem

School district leaders and administrators place great emphasis on state standardized test results to make what is believed to be “informed” decisions regarding future student placement and overall academic standings (Tienken, 2008). The New Jersey State Report Card quantifies and communicates 35 fields of information regarding schools, including, the school environment, staff, students, student performance indicators and district finances (NJ School Report Card, 2010). Silva (2007) in an exploration of literature relating to achievement and instructional minutes would find that much of the extant literature considered engaged time broadly as opposed to instructional minutes specifically, creating a gap in the existing data on the subject. Given that Aronson, Zimmerman, and Carlos (1998) would find that engaged time increased

achievement learning, it is important that the instructional minutes variable found within the New Jersey State Report Card be further researched. Therefore, a quantitative study analyzing the influence of instructional minutes of the school day and what influence, if any, it has on the standardized New Jersey High School Proficiency Assessment is warranted.

Purpose for the Study

Standardized tests and their results are facing increasing criticisms given that they have been said to fail to account for major determinants in student achievement (Mandel & Sussmuth, 2011). My purpose for this study was to explain the amount of variance in HSPA-11 mathematics and language arts scores accounted for by the amount of instructional minutes at high schools in New Jersey. A proportional, stratified random sample will be generated and subsequently analyzed to determine the influence of NJ School Report Card-instructional minutes on NJ HSPA-11 language arts and mathematics scores.

Research Questions

The research goal is to elaborate upon the influence of instructional minutes upon NJ HSPA-11 Language Arts (LA) and Mathematics (MA) scores. The central and guiding research question to be capitalized upon herein is thereby: What is the influence of instructional minutes on Grade 11, 2011 New Jersey state-mandated High School Proficiency Assessment (HSPA) scores when controlling for student, school, and staff variables?

Research Question 1: What is the strength and direction of the relationship between instructional minutes on the Grade 11, 2011 New Jersey state-mandated High School Proficiency

Assessment (HSPA) scores in Language Arts when controlling for student, school, and staff variables?

Research Question 2: What is the strength and direction of the relationship between instructional minutes on the Grade 11, 2011 New Jersey state-mandated High School Proficiency Assessment (HSPA) scores in Mathematics when controlling for student, school, and staff variables?

Null Hypothesis

Null Hypothesis 1: No statistically significant relationship exists between instructional minutes and school score performance on the 2011 Grade 11 NJ HSPA for the 326 New Jersey high schools as measured by a score of Proficient or above.

Null Hypothesis 2: No statistically significant relationship exists between instructional minutes and the Language Arts school score performance on the 2011 Grade 11 NJ HSPA for the 326 New Jersey high schools as measured by Proficient or above.

Null Hypothesis 3: No statistically significant relationship exists between instructional minutes and the Mathematics school score performance on the 2011 Grade 11 NJ HSPA for the 326 New Jersey high schools as measured by Proficient or above.

Independent Variable: Instructional Minutes

Within the confines of this study, the variable of instructional minutes will be assessed, as it is relayed on the NJ School Report Card. While the NJ School Report Card does not include the variable of engaged time, instructional minutes compared to the included variable of length of the school day will be undertaken to create an estimate of engaged time. Unlike some

variables, instructional minutes can be directly altered or influenced by school districts (Eren & Millimet, 2007; Walberg, 1988).

Dependent Variable: High School Student NJ HSPA Achievement

The dependent variable to be measured within the confines of this study is student achievement on the Grade 11 NJ HSPA 2011. To this end, the scores from both the language arts and mathematics sections will be taken into account. Each of these sections is scored on a range of one to three-hundred, with two-hundred to two-hundred and fifty representing the passing proficient score, with each section being scored, and either passed or failed, separately. A score of two-hundred and fifty to three hundred represents an advanced proficient score, while a score of less than two-hundred represents the categorization of partially proficient, with this in turn resulting in failure for the student (NJDOE, 2009). Within the confines of this study a score of proficient or greater is to be the measurement value applied to the dependent variable.

Significance of the Study

Through the creation of empirical data concerning the influence of instructional minutes upon NJ HSPA-11 language arts and mathematics scores, future practice may benefit. Through the establishment of a more intimate understanding of the influence instructional minutes have upon these scores, the means through which instructional minutes may be maximized will become more apparent, in turn providing for superior academic achievement amongst the target population. Additionally, through the framing of the significance of instructional minutes, alternative variables that impact achievement on the NJ HSPA scores may in turn be highlighted and quantified in influence and importance.

The results of this study may present policymakers and educators with an increased ability to:

- Better identify the factors that influence student achievement
- Maximize the productivity of instructional minutes
- Better understand the relationship between student achievement and assessments
- Make informed and appropriate decisions relating to curriculum design and the instructional minutes allocation therein

Through the establishment of a greater understanding and empirical basis of the influence of instructional minutes upon the NJ HSPA-11 language arts and mathematics test scores, the education system and all stakeholders therein may make more informed decisions relating to instructional minutes practices in the environment of education. The purpose of this research is significant in that it seeks to provide an empirical foundation upon which positive change in the educational system may be built.

Limitations of the Study

Findings state that “non-experimental research is frequently an important and appropriate mode of research in education” (Johnson, 2001). Therefore, this study will be quantitative and non-experimental in nature, investigating the impact of instructional minutes as found in extant literature on student achievement in addition to aggregate district student NJ HSPA scores in Grade 11 language arts and mathematics. As a result of this design, the study will be limited by data consulted within the extant literature and aggregate district scores. The lack of experimentation allows for a consideration of existing relationships and how this may be interpreted, however it is unable to provide for any testing of causality. Any limitations upon the

validity of these findings in turn are assumed by this study and are to be taken into account in assessing the correlational and explanatory empirical data that is in turn generated. Silva (2007) has noted that much of the extant literature in place relating to the subject is concerned with engaged time as opposed to solely instructional minutes.

Delimitations of the Study

The delimitations of the study are clarified through a consideration of the variables being tested. The purpose of the study is to provide an exploratory quantitative assessment of existing literature relating to instructional minutes and student achievement upon the NJ HSPA exam. To this end variables relating to student achievement will be taken into account, as well as those variables such as race or socio-economic background that impact the level of student achievement. The use of the NJ HSPA precludes a consideration of any other measurements of student achievement, thereby eliminating any and all other means of assessment from inquiry. The use of the NJ School Report Card to determine instructional minutes in turn delimits the study from assessing alternative sources for this data, with the NJ School Report card being broken into thirty-five variables within the categories of school environment, students, student performance indicators, staff, and district finances (NJDOE, 2009).

Definition of Terms and Abbreviations

The terms defined below were retrieved from The State of New Jersey Department of Education's website.

Accountability. The federal No Child Left Behind Act (NCLB) requires all states to establish standards for accountability for all schools and districts in their states. The accountability system looks at the degree to which students across schools and districts are mastering the state

standards. NCLB has set the goal of 100% proficiency by the year 2014, with states setting incremental annual benchmarks to hold them accountable.

Achievement Gap. The variance of student achievement between groups.

Adequate Yearly Progress (AYP). NCLB mandates that each state measure the progress made toward reaching the 100% proficiency goal for all students in language arts and mathematics. Each state implements annual benchmarks to ensure that this goal is achieved by the year 2014.

Alternative High School Assessment (AHSA). The AHSA offers an alternative means of meeting the state assessment requirement for high school graduation. The AHSA is available to students who have met all high school graduation requirements except for demonstrating proficiency in High School Proficiency Assessment (HSPA) Mathematics and/or Language Arts Literacy. (N.J.S.A. 18A:7C-3 & N.J.A.C. 6A:8-4.1) The AHSA consists of untimed open-ended performance assessment tasks (PATs) administered locally and scored under standardized conditions by the state testing vendor.

Assessment. Assessments ascertain student skills and knowledge. The statewide assessment system comprises of state tests that are designed to measure student progress in the attainment of the Core Curriculum Content Standards. Under the NCLB, all states are required to assess student progress in Language Arts and Mathematics in Grades 3-8 and Grade 11. The states also assess science in Grade 4 and 8. High Schools show assessment results from the administration of the HSPA in Language Arts and Math. The HSPA is the test that students must pass in order to graduate from high school. Retests are not included in these results (NJDOE, 2011a)

Attendance Rate. These are the grade-level percentages of students on average who are present at school each day. They are calculated by dividing the sum of days present in each grade level by the sum of possible days present for all students in each grade. The school and state totals are calculated by the sum of days present in all applicable grade levels divided by the total possible days present for all students.

Average Class Size. Average class size for elementary schools (Pre K-8) is based on the enrollment per grade divided by the total number of classrooms for that grade. For elementary grades, the state average is the statewide total enrollment for each grade divided by the statewide total number of classrooms in that grade.

District Factor Group. DFG classifications are based on U.S. Census data and are revised every 10 years. The DOE uses DFG data to analyze the relationship between student achievement and the socioeconomic status of the communities in which they reside. The six census data indices used in the DFG statistical model include the percentage of each district's population with no high school diploma, the percentage with some college education, and the poverty level and unemployment rate of the district, as well as the residents' occupations and income. The analysis and weighting of these components is used to produce a statistical score for each district, which is then ranked and placed into one of eight groupings —A, B, CD, DE, FG, GH, I, and J. Each grouping consists of districts with similar factor scores. I and J districts score highest on the socioeconomic scale.

Elementary and Secondary Education Act (ESEA). ESEA was passed in 1965 as a part of the “War on Poverty.” It emphasizes equal access to education and establishes high standards and accountability. The law authorizes federally funded education programs that are administered by

the states. In 2002, Congress amended ESEA and reauthorized it as the No Child Left Behind (NCLB).

Every Student Succeeds Act (ESSA). Signed into law on December 10, 2015 by President Obama, the ESSA is the latest reauthorization of the 1965 Elementary and Secondary Education Act, and replaces the No Child Left Behind Act of 2001. The ESSA grants flexibility and authority for states around assessment systems, accountability systems, interventions, student supports, educator evaluation, support systems and use of federal funds.

Faculty and Administrator Credentials. Percentages of faculty and administrative members in the school who hold a bachelor's, master's, or doctoral degree. For vocational and special services schools, there is also information about licenses or certification in addition to or in place of degrees.

Faculty Attendance Rate. The average daily attendance for the faculty of the school. It is calculated by dividing the total number of days present by the total number of days contracted for all faculty members.

Faculty Mobility Rate. This represents the rate at which faculty members come and go during the school year. It is calculated by using the number of faculty who entered or left employment in the school after October 15 divided by the total number of faculty reported as of that same date.

Free or Reduced Lunch (Socioeconomic Status). Students are entitled to free lunches if their families' income is below 130% of the annual income poverty level guideline established by the U.S. Department of Health and Human Services and updated annually by the Census Bureau.

General Educational Development (GED). Tests designed by a national organization to measure skills and concepts associated with four years of regular high school instruction. Each test is developed by adult and secondary educators and subject matter specialists. Each of the five tests corresponds to the general framework of most high school curricula: writing skills, social studies, science, interpreting literature and the arts, and mathematics.

Instructional minutes. Instructional minutes are defined as the amount of time each day that a student is engaged in instructional activities under the supervision of a certified teacher (Silva, 2007).

Instructional Time - This is the amount of time per day that a typical student is engaged in instructional activities under the supervision of a certified teacher.

Length of School Day - This is the amount of time a school is in session for a typical student on a normal school day.

Limited English Proficient (LEP) Students- This is the percentage of LEP students in the school. It is calculated by dividing the total number of students who are in Limited English Proficient programs by the total enrollment.

NJDOE. The New Jersey Department of Education.

New Jersey High School Proficiency Assessment (NJ HSPA). The HSPA is a statewide assessment system comprised of tests designed to measure student progress in the attainment, knowledge and skills identified in the Core Curriculum Content Standards. The HSPA is a means of determining the efficacy of a curriculum based upon the performance of students on the assessment, with the results thereof in turn being used to guide practices. Additionally, the results are used to meet requirements as prescribed by the No Child Left Behind Act of 2001 (NCLB). According to the NJ HSPA, all first-time eleventh graders must take the HSPA in mathematics and language arts literacy, and all retained eleventh graders, twelfth graders, retained twelfth graders, and returning adult high school students must also pass both sections of the HSPA (Schundler, 2010).

No Child Left Behind. The No Child Left Behind Act (NCLB) of 2001 was signed into law on January 8, 2002, by President Bush. The Act represents the president's education reform plan and contains the most sweeping changes to the Elementary and Secondary Education Act (ESEA) since it was enacted in 1965. NCLB changes the federal government's role in K-12 education by focusing on school success as measured by student achievement. The Act also contains the president's four basic education reform principles of stronger accountability for results, increased flexibility and local control, expanded options for parents, and an emphasis on teaching methods that have been proven to work.

Student Achievement. For the purpose of this study, student achievement is defined by test scores. Each range of scores fits categories which are known as Proficient, Advanced Proficient and Partially Proficient. Achievement is reached when students' scaled New Jersey Ask scores fall in the Proficient or Advanced Proficient range.

Student Attendance Rate: These are the grade-level percentages of students on average who are present at school each day. They are calculated by dividing the sum of days present in each grade level by the sum of possible days present for all students in each grade. The school and state totals are calculated by the sum of days present in all applicable grade levels divided by the total possible days present for all students (NJDOE, 2012b).

Students with Disabilities. This is the percentage of students with an Individualized Education Program (IEP), including speech, regardless of placement and programs. This is calculated by dividing the total number of students with IEPs by the total enrollment.

Student Mobility Rate - This is the percentage of students who both entered and left during the school year. The calculation is derived from the sum of students entering and leaving after the October enrollment count divided by the total enrollment.

Organization of the Study

The study will be organized in a largely linear fashion, providing for an effective foundation of methods and data prior to undertaking empirical research and subsequent analysis. Following the introduction, the review of literature will explore in depth the essential existing

research on factors that influence achievement upon the NJ HSPA-11, in addition to a comprehensive analysis of instructional minutes, and other related variables. Design and methods will in turn be explored, clarifying the means through which data will be collected and in turn assessed. Following this will come a comprehensive analysis of the data, exploring in depth the relationship between the independent and dependent variables. Through the data analysis pertaining to the influence of instructional minutes upon NJ HSPA-11 language arts and mathematics achievement, the empirical data of the study will be generated and in turn explored in depth. The study completes with the presentation of conclusions, coupled by recommendation as to how the findings may in turn influence practice and also future research.

CHAPTER II

LITERATURE REVIEW

Introduction

The purpose of this study was to determine the strength and direction of the relationships between instructional minutes and other student, teacher and school variables found in the extant literature that influence student achievement and aggregate district New Jersey High School Proficiency Assessment scores in Grade 11 Language Arts and Mathematics. The main research question guided the review of the literature and consisted of the 2011 NJ School Report Card, high-stakes testing, student variables, staff variables and school variables.

This study reviewed the current and seminal literature on the statistical significance, if any, between instructional minutes and student achievement score on the NJ HSPA 2011 and outlines the relationship between student, teacher and school variables, and student achievement. The intent is to inform education leaders, researchers, and policymakers about the present evidence regarding instructional minutes as an achievement predictor.

Literature Search Procedures

The literature reviewed for this chapter was collected using online databases including JSTOR, EBSCOhost, ProQuest, Academic Search Premier and ERIC, as well as online and print editions of peer-reviewed educational journals. Each section of reviewed literature includes quasi-experimental, experimental, meta-analysis, and/or non-experimental treatment/control group studies. The most efficacious manner to “present results of similar studies, to relate the present study to the ongoing dialogue in the literature, and to provide framework for comparing the results with other studies” (Creswell, 1994), culminated in the utilization of the framework for scholarly literature reviews advanced by Boote and Beile (2005). Some of the keywords used

to locate literature in the research included academic achievement, academic learning time, achievement testing, engaged time, high school testing, instructional minutes, standardized testing and student achievement.

Methodological Issues

A series of issues were encountered upon reviewing the literature, particularly the research related to instructional minutes and the student, teacher and school variables linked to the influence on student achievement, more specifically on standardized state tests. The methodological issues that were evident in the research related to each of the variables were: (a) the lack of clarity on terms used; (b) the lack of consistency of the terms used; (c) the lack of experimental studies, which resulted in a dependence on correlational designs; (d) the reporting of varying, mixed results that were gathered using the same data.

Current research involving instructional minutes was limited in quantity. Quasi-experimental designs were weak because the sample sizes were small. Quasi-experimental and non-experimental research were employed as a consequence. Studies found significant relationships but resulted in very low correlation coefficients. Accordingly, the analysis methods used mostly correlation coefficients.

Since few studies center on instructional minutes and its influence on student achievement at the high school level, the goal of this study was to offer evidence on how much variance, if any, instructional minutes, as a predictive variable, has on aggregate student performance on Grade 11 NJ HSPA scores. A variation of terms was used with similar definitions. Due to the possible confusion regarding the usage of a term, I provided a synthesized definition from the literature. For example, there is not clear, concise, widely accepted

delineation of the composition of time specified for activities or events in school. Due to the issues with terminology, searching for the literature relating to “instructional minutes” stood as a challenge. The applicable aspects associated with instructional minutes within the school setting are grounded in the work of Anderson (1983), Bloom (1976), and Fisher, et al. (1980), who based their findings on the work of John B. Carroll. Hence, the Carroll landmark 1963 article, "A Model of School Learning," worked as the impetus when reviewing literature referring to that topic.

Inclusion Criteria

Research used in this review had to contain the following criteria in order to be included:

1. Studies which were experimental, quasi-experimental, meta-analysis, and/or non-experimental studies or those that could be considered causal-comparative
2. Peer-reviewed research including articles, dissertations and government reports
3. Published within the last 25 years
4. Studies that included high schools
5. Studies that focused on student achievement
6. Any literature found in a government report that meets the above criteria
7. Seminal works

Review of Literature Topics

Studies that involved the NJ Report Card variables and testing were included in the literature review. The New Jersey High School Proficiency Assessment (NJ HSPA) assessed both Language Arts and Mathematics in separate sections with scores that range from 100-300.

Results are categorized as Partially Proficient if students scored 199 or below, Proficient if students scored between 200 and 249, and Advanced Proficient if students scored between 250 and 300. Pursuant to the New Jersey Department of Education (NJDOE), the New Jersey High School Proficiency Assessment was administered between May 1 and May 3, 2011. Of the 98,218 students enrolled to take the test, it was found that in Language Arts Literacy, 68.8% of all students scored at the Proficient level and 20.8% scored at the Advanced Proficient level. In Mathematics, 49% scored at the Proficient level and 25.3% scored at the Advanced Proficient level. The mean scale score in Language Arts Literacy was 229.9 and in Mathematics was 222.8 (NJDOE, 2012).

Current studies, peer reviewed articles, scholarly works, government reports, books, several dissertations, as well as relevant or seminal work that could explain or provide background information or data on the dependent or independent variables and predictor variables were included in the literature review. Using research from 2008 to 2015 enabled the significant selection of information included in this study. However, this literature review also used work found outside that date range because information on certain variables was unavailable or because it was deemed significant, such as seminal or pivotal research.

New Jersey School Report Card

Annually, the New Jersey Department of Education (NJDOE) disseminates the New Jersey School Report Card, which contains school environment, student, student performance indicators, staff, and district finance data (DOE, 2012). The New Jersey Department of Education explicates that “the function of the New Jersey School Report Card is to increase school- and district-level accountability for educational progress by communicating useful

information to members of the public to be used in measuring how well their schools are doing” (Gemellaro, 2012). These reports offer information to the public about school performance as well as convey valuable data to educators and districts to assist in setting goals, developing local improvement plans, and making comparisons against peer schools (de Angelis, 2014). High stakes testing proficiency rates are used to categorize New Jersey public schools as Priority, Focus, and Reward Schools. Reward schools have achieved high proficiency levels or high levels of growth, including progress toward closing the achievement gap, while Priority schools have been identified as among the lowest-performing five percent of Title I schools in the state over the past three years, or a non-Title I school that would otherwise have met the same criteria. Focus schools comprise about 10% of schools with the overall lowest subgroup performance, a graduation rate below 75% and the widest gaps in achievement between different subgroups of students. Focus Schools receive targeted and tailored solutions to meet the school's unique needs (NJDOE, 2014). My research examined student, staff, and school predictor variables from three categories included on the New Jersey School Report Card.

The No Child Left Behind Act

The No Child Left Behind Act (NCLB) is the most significant and largest federal intervention into the environment of education in the history of the U.S. The underlying promise of the NCLB is to improve upon student learning. In addition to this, the achievement gap between White students and students of color, as well as other students classified as disadvantaged, is meant to be closed. Among the many federal mandates associated with NCLB is the requirement that statewide testing programs be set up for the purpose of issuing transparent and easy-to-read school and district report cards detailing achievement test scores of students by

subgroup (ethnicity, special education, English language learners, and economically disadvantaged) at the school level (Schoen & Fusarelli, 2008). Despite issuing promises to this regard and receiving ongoing support, the NCLB has largely failed to deliver. Rather, the NCLB has served to further the inequality inherent within the system (Hursh, 2007). Studies have documented how the unintended consequences of accountability systems may interfere with these goals (Cullen & Reback, 2006; Deere & Strayer, 2001; Figlio, 2005; Figlio & Getzler, 2002; Jacob, 2005; Jacob & Levitt, 2003; Haney, 2000; McNeil, 2000, 2005; McNeil & Valenzuela, 2001; Vasquez Heilig, 2006). Under NCLB laws, schools are held accountable for the academic performance of limited English speaking children and other groups. Should these students fail to meet the standards established by the NCLB, the schools are subject to interventions ranging in severity from allowing parents to send their children to another school, to school funding cuts and even closure. States are held accountable for ongoing improvements in the achievement of this population. The achievement of this population is reported separately from other groups of students, with more than half of the states requiring a minimum of thirty to forty children to create such a separate population (Capps, Fix, Murray, Ost, Passel, & Hernandez, 2005). The interventions of the NCLB as discussed, however, can be quite extreme, with the ongoing failure of 30-40 students within a given school, as a result of these interventions, having the capacity to result in the closure of the entire school, thereby denying all students access to education therein.

The underlying purpose of the No Child Left Behind Act was to underline the role of government in education, and to in turn respond to the failures of the past to provide for a basic and universal level of quality therein. Horace Mann would establish his educational theory that largely focused upon the elimination of social inequality in education surmising that “education

then, beyond all other devices of human origin, is a great equalizer of the conditions of men—the balance wheel of the social machinery” (Mann, 1848). In addition to this, Mann endeavored to establish public responsibility for the provision of equal opportunity, as well as social and political unity within the education system. This is reflected in the NCLB, which has identified public education as being a source of various political and economic problems. To rectify these problems, it was necessary to create means of quantification and measurement, with standardized testing providing a solution to this necessity (Garrison, 2009). Ryan (2004) has argued that while the NCLB is meant to increase academic achievement in schools of the U.S., raise the performance of economically disadvantaged students to the level of their peers of greater affluence, and to attract qualified professionals to teach, with these qualified professionals being present in all U.S. classrooms, the incentives created by the act work counter to their achievement.

An additional critique is that the NCLB serves to encourage states to lower their academic standards indirectly, an unintended consequence being that educators do not alter the way they allocate instructional resources. Instead, they adopt a series of creative accounting practices, such as exempting potentially low-scoring students from state tests, to increase passing rates (Cullen & Reback, 2006; Figlio, 2005; Figlio & Getzler, 2002; Jacob, 2005). The lowering of standards to achieve minimal scores may accomplish national equity, although it serves to harness as opposed to encourage high performing schools. The NCLB likewise promotes school segregation and the pushing out of minority and poor students, and also discourages good teachers from accepting positions within challenging classrooms (Ryan, 2004). Fusarelli (2004) advances that despite its goals of addressing equity issues in public education; the NCLB is unlikely to enhance equity and opportunity through a reduction in the achievement gap. This is

due to insufficient funding to meet the goals set forth by the act, and additionally due to the application of an excessively simplistic definition of the achievement gap. Educators fundamentally change the way that they distribute educational resources by diverting resources to students close to passing the test and thus most likely to improve the passing rate or by shifting resources away from exempted students who will not sit for state tests (Booher-Jennings, 2005; Gillborn & Youdell, 2000; Neal & Schanzenbach, 2007; Reback, 2006). The implementation of the NCLB will in turn force most states to use the scores on standardized reading and math tests as the sole measure of student progress. The organization Achieve, Inc., a test-promoting organization, argues that most state standardized tests are not particularly strong and also cannot assess higher-order thinking, something that the federal Elementary and Secondary Education Act requires. “Proponents of holding all students to the same standard (i.e., testing all students on the same grade-level tests) contend that exemptions or alternate assessments for these students perpetuate the educational neglect that NCLB is intended to correct. If students are exempted or held to a different standard, they argue, schools will have little incentive to focus time and attention on these students. As a result, they are unlikely to ever reach proficiency” (Jennings & Beveridge, 2013). It is feared that as opposed to teaching students a rich curriculum that in turn prepares them for life, they instead will be coached to pass tests (Neill, 2003).

History of Assessment: HSPA in New Jersey

The New Jersey State Legislature in 1975 passed the Public School Education Act (PSEA), as instrumentation to align all New Jersey school children with educational opportunities which would prepare them to fully function in a democratic society. To expedite the objective of providing a quality educational opportunity, and creating civic minded youth, the Legislature amended the PSEA to establish minimum standards of achievement in basic communication and computational skills. This standardized program of assessment became known as the Minimum Basic Skills (MBS) program for reading and mathematics. This statewide assessment was administered from 1978 through 1982 and was applicable to third, sixth, and ninth grade students (NJ DOE, 2006). In 1976 New Jersey began to administer an exit exam as a graduation requirement (NJ DOE, 2006). Using the MBS program as a mechanism to prepare students, in 1981-82, New Jersey began to require all ninth grade students to pass the Minimum Basic Skills Test (MBST) as a requirement to receive a high school diploma. This was the first use of an exit examination as a requirement for graduation from a New Jersey high school (NJ DOE, 2006). The Minimum Basic skills program had been administered as a component within a series of a multiple assessment program or “portfolio” assessment through which students would need to exhibit reading and mathematics mastery through a series of benchmarks, but would not necessarily be retained, if they did not pass the exit examination.

In 1983-84, New Jersey launched the High School Proficiency Test, a more rigorous test of minimum basic skills in reading, writing, and mathematics for ninth graders. The examination was not administered as a graduation requirement until 1985-86. The New Jersey Department of Education (DOE) adjusted their assessment program by establishing the High School Proficiency Test 11 (HSPT11) and Early Warning Test (EWT8) (NJ DOE, 2006). The EWT8 was initially

designed as a benchmark assessment; a tool for placement and planning. However, in 1991 the HSPT11 replaced the HSPT9. In 1993, the HSPT11 and EWT were both used as indicators for promotion and graduation requirements. The EWT was used to promote students from 8th to 9th grade. The HSPT11 was used as the high school graduation requirement. In 1993, the HSPT11 was first administered to regular eleventh grade students as a graduation requirement. The New Jersey State Board of Education adopted the Core Curriculum Content Standards (CCCS) in 1996. The CCCS was created as a set of standard benchmarks to be assessed at the 4th, 8th, and 11th grade years to “clearly define what all students should know and be able to do at the end of thirteen years of public education” (NJ CCCS, 2006). The CCCS is meant to provide guidance to local districts creating their own curriculums while using the standards to provide some uniformity of what students are learning across the state (NJDOE, 2006). The CCCS is an attempt by the DOE to comply with the 1875 New Jersey Constitutional provision of “thorough and efficient” education as interpreted by the New Jersey Supreme Court in the historic case of *Robinson v. Cahill*, 303 A.2d 273 (1973). The NJ Supreme Court found that the New Jersey Constitution requires that all New Jersey students receive a “thorough and efficient” education. To this end, the Court found that New Jersey’s funding scheme (heavily reliant on property taxes SRA 2003-2008 11 IELP/NSRC 2011 to fund education), monitoring systems and educational programs violated the 120-year-old constitutional provision of “thorough and efficient” (Robinson, 1973). Robinson was followed by the *Abbott v. Burke* decisions (I-XVII) in which the Court ordered, amongst other things, “parity” funding, or additional state funds to bring per-pupil expenditures in the Abbott districts up to the per-pupil expenditures in the state’s wealthiest districts (Abbott, 1994). Pursuant to the “thorough and efficient” constitutional requirements and the attempts to define exactly what “thorough” education is, the CCCS is applicable to all New

Jersey students and is reviewed every five years (NJ CCCS, 2006). The aim of the CCCS adoption is to insure that each of the over 600 local New Jersey school districts align their curriculum to achieve the ultimate goal of creating students prepared to participate socially, politically, and economically in a democratic society (NJ CCCS, 2006). In 1998, the New Jersey legislature enacted legislation in the form of the New Jersey State Assessment program (N.J.S.A. 18A: 7C-6.2) and replaced the HSPT11 with the High School Proficiency Assessment (HSPA). The HSPA is meant to align and embody the math and language standards in the CCCS in one examination which will be administered to all eleventh graders as a requirement for graduation from a New Jersey high school. The HSPA examination was first administered to those students entering 11th grade on or before September 1, 2001. The HSPA assesses achievement in reading, writing, and mathematics as required by the CCCS. The examination is administered in March to all 11th grade students throughout New Jersey. If failed, the HSPA is re-administered in the fall and spring of the student's senior year (NJ Assessment, 2006). The districts receive individual student reports ("ISR") indicating the proficiency of each student in specific content areas. Prior to the reform of the alternative assessment, those students failing to demonstrate proficiency, (defined by the HSPA as a scaled score of 200+ in either Language Arts Literacy or Mathematics) were eligible for the Specialized Review Assessment ("SRA"). Students failing the HSPA were required to demonstrate proficiency via a CCCS and HSPA aligned SRA assessment measure. New Jersey Statute (N.J.S.A. 18A:7c-3) and Administrative Code (N.J.A.C. 6.8-7.1) provided for the alternate assessment known as the Special Review Assessment (SRA).

In August 2005, the New Jersey State Board of Education adopted a resolution endorsing the elimination of the SRA, while charging the NJDOE to identify an alternate mechanism for students who fail the HSPA. The proposal sought to improve the alternate vehicle for

demonstrating proficiency on the Core Curriculum Content Standards (CCCS). Along with many others, the resolution called for the establishment of specific administration windows for the alternate high school assessment; requirement for districts that disproportionately rely on the SRA (or alternate high school assessment) to develop a plan to reduce the number of students using it and to report annually their progress in reducing this level of dependence; and to rename the SRA to reflect more fairly its close relationship to the content standards on which the HSPA itself is based: e.g., Alternative High School Assessment (AHSA) (NJDOE, 2008).

In September 2009, the AHSA replaced the SRA as the alternative assessment for students that did not pass the HSPA. The AHSA offered an alternative means of meeting the state assessment graduation requirement. The AHSA is available to students who have met all high school graduation requirements except for demonstrating proficiency in High School Proficiency Assessment (HSPA) Mathematics and/or Language Arts Literacy. (N.J.S.A. 18A:7C-3 & N.J.A.C. 6A:8-4.1) The AHSA consists of untimed open-ended performance assessment tasks (PATs) administered locally and scored under standardized conditions by the state testing vendor. There are several administration windows within which AHSA performance assessment tasks may be administered locally and then sent to the state testing vendor for scoring (NJDOE, 2008).

New Jersey has been phasing in course-taking requirements, implementing more rigorous standards for all students, and transitioning their statewide assessment program from the High School Proficiency Assessment (HSPA)/Alternative High School Assessment (AHSA) to the Partnership for Assessment of Readiness for College and Careers (PARCC) assessments. The PARCC aims to assess the full range and breadth of the standards and play a significant role in the improvement of instruction or the advancement of student learning outcomes. The PARCC

will be the test of record for the Class of 2016; the 2014-2015 school year will be the final testing year for the AHSA (NJDOE, 2014).

Student Attendance

According to Altman and Meis (2012–2013), “Each year, 7.5 million or about 15% of K-12 students are absent from school for an entire month” (p. 319). Accountability measures for schools to be teaching bell to bell to ensure that every minute of the school day is spent on instruction is due to the No Child Left Behind Act of 2001 (P.L. 107-110) and the mandate to improve student academic achievement to close the gap in all core academic areas. Frequently tardy students affect teachers’ ability to meet this mandate. These students miss the beginning instructional messages and lessons causing “extensive affects to the entire student population to meet rigorous academic standards” (Tyre, Feuerborn, & Pierce, 2011). Studies have shown that class attendance is an important predictor of academic outcomes: students who attend more classes earn higher final grades (Kirby & McElroy, 2003; Moore et al., 2003; Purcell, 2007; Silvestri, 2003).

Students may be absent for a variety of reasons including illness and family situations (Maxwell, 2016). Duran-Naruckis’ (2008) study indicates absenteeism may be linked to school building condition and students' perception of the social climate, which includes academic expectations (p. 279). Poor school building condition is also associated with student problem behaviors such as absenteeism and dropout rate (Branham, 2004; Evans, Yoo, & Sipple, 2010). A link between school building condition and student absenteeism was found by other researchers (Duran-Narucki, 2008; Branham, 2004). School buildings that are attractive encourage students to want to come to school (Maxwell & Schechtman, 2012). The current findings, that school building condition is linked to the perception of social climate, suggests that

student perception of the social climate may provide some explanation for the link between building quality and student attendance. School buildings that are in good condition and attractive, may signal to students that someone cares and a more positive social climate which in turn may encourage better attendance (Maxwell, 2016). If students are absent they will not receive the benefit from instruction as Sheldon affirmed in 2007 with a study that confirmed reading and mathematics test results highly correlated to student absences.

Davies and Lee (2006) indicated that non-attendance at high school was often the result of a problematic transition from primary school, and again in the transition from Year 9 to Year 10. This finding was confirmed by O'Connor et al. (2011), who asked a student excluded from school to plot how happy he was on a graph in relation to each academic year, from 'extremely happy' to 'extremely unhappy.' This showed that the student was extremely happy during primary school, and then extremely unhappy after the transition to secondary school. This could be something to do with the adjustment of the school schedule in which students "travel" from class to class and must engage with a variety of subject teachers throughout the school day. Each individual student has to see up to 14 different teachers a week, and many teachers see far too many students for such a short time that there is little time to forge meaningful student-teacher relationships (Arthurs, Patterson & Bentley, 2014). This disconnect ultimately led to poor achievement on assessments.

Pellegrini (2007) stated, "School is one of the main social agencies contributing to the creating of the 'citizen'; playing a paramount role in teaching essential skills to enable them to function in their environment" (p. 63). Pellegrini (2007) reported that students frequently absent from school "suffer from forms of anxiety about school and do not attend with parents' knowledge and conversely, other students are absent due to lack of interest and motivation,

without any clinically significant characteristics without parents' knowledge" (p. 64). Pillay et al. (2013) identified the loneliness students may feel as a contributor to their absence. Some students reported feeling lonely and pushed out, particularly when other previously excluded students were being reintegrated into school. Pillay et al. (2013) also pointed out that a student who has missed a lot of school has by default suffered disruption to their academic progress, which makes it difficult for them to simply acclimate when they do attend. As students continue to miss instructional time the achievement gap widens and makes learning more difficult for students who are unable to catch up with their peers. Every instructional day counts. Every minute in that instructional day matters (Mahoney, 2015). In light of the considerable amount of instructional time that can be lost as a result of student attendance this study makes an important contribution to the literature base. The reviewed literature indicated that there is a significant relationship between student achievement and attendance therefore attendance is a strong predictor of student achievement on state mandated assessments.

Student Mobility

Fourteen percent of all school-aged children in the United States moved to a different residence between 2006 and 2007 (Rhode Island KIDS COUNT, 2009). According to the US Census Bureau (2009), one in eight Americans changed residences between 2007 and 2008. Studies have indicated that current mobility rates may be even higher and increasing; significantly affecting low-income, minority students (National Research Council and Institute of Medicine, 2010). Student mobility is defined as the phenomenon of students changing schools for a reason that is not due to grade promotion (Rumberger, 2002). School mobility occurs more often among students who experience a variety of risk factors, including poverty or low socioeconomic status; homelessness; ethnic minority status; residing in low-income, single-

parent homes; reduced parental involvement; residential instability; and placement in special education (Fantuzzo et al., 2009; Obradovic et al., 2009; Ou & Reynolds, 2008; South, Haynie & Bose, 2007). School mobility is much more common in urban schools, which tend to serve higher rates of low-income, high-risk students (National Research Council and Institute of Medicine, 2010). Poor families move out of obligation most often, and is more likely to impact the children (Lesisko & Wright, 2009). Students of such high-risk backgrounds are less likely to start school ready to learn and more likely to fall behind their advantaged peers (Burchinal, Roberts, Zeisel, & Rowley, 2008). Research has indicated that students who transfer between schools frequently during the school year are at a higher risk for both behavioral and academic problems. Students in the United States frequently change schools (Burkam, Lee, & Dwyer, 2009), and disadvantaged students change schools more frequently than advantaged students (U.S. General Accounting Office [GAO] GAO, 2010). These changes may harm students (GAO, 2010; Reynolds, Chen & Herbers, 2009), and school policies and programs may influence how often students change schools (Reynolds et al., 2009).

Student achievement between mobile and non-mobile students has been linked to students' background characteristics, such as the race or family income of the student. Schools with high rates of student mobility often have a large population of children of migrant workers, homeless children, or children of low-income families who are moving for reasons of necessity (National Research Council and Institute of Medicine, 2010; Schafft, 2009). Research conducted on mobility and achievement concludes that mobility is a large threat to academic achievement and the school environment (Reynolds, Chen, & Herbers, 2009). "Transfers to a new school, is cited as a warning sign that a student could disengage and eventually drop out" (Bridgeland, DiIulio, & Morison, 2006). "In 2007, the dropout rate of students in low-income families was 10

times greater than the dropout rate of students in high-income families” (Cataldi, Laird, & KewalRamani, 2009). Furthermore, students who changed schools are at risk for social problems and psychological difficulties, including less social competence and low self-esteem (South et al., 2007), lower school achievement, as well as truancy and suspension from school (Fantuzzo, Rouse, & LeBoeuf, 2009; Reynolds et al., 2009). In a Chicago study, for example, youth with three or more moves had significantly lower school achievement and lower rates of dropout than was predicted from a model assuming a linear association (Temple & Reynolds, 1999; Ou & Reynolds, 2008). In another study, 13 of 158 high school dropouts indicated recurrent changes to their residence as their reason for dropping out (Meeker, Edmonson & Fisher, 2009).

School mobility being a fairly common experience for many students, with approximately 75% of students changing schools at least once between kindergarten and 8th grade; it is important to understand how changing schools might impact students and communities (Torre & Gwynne, 2009). Though studies examining school mobility have increased over the past few decades, results can be difficult to interpret because of the complexity of the problem, the limitations of methodologies, and inconsistencies across studies (Mehana & Reynolds, 2004; Reynolds, Chen, & Herbers, 2009). It is clear however, that school mobility has been implicated as a risk factor for a variety of negative developmental outcomes (Gruman et al., 2008). These students are more likely to experience grade retention and more likely to drop out of school (Ou & Reynolds, 2008; South et al., 2007), concluding that mobility is a large threat to academic achievement (Kennelly & Monrad, 2007).

Percentage of Students with Limited English Proficiency (LEP)

According to the accountability measures of the No Child Left Behind Act (NCLB), all major subgroups of schools, Limited English Proficiency (LEP) students being in this category, can meet Annual Yearly Progress (AYP) only if their achievement targets are fulfilled (USDOE, 2009). In tandem with the 1974 Supreme Court decision in *Lau v. Nichols* (414 U.S. No. 72-6520, pp. 563-572), which required schools to teach English Language Learners (ELLs) so that they have “a meaningful opportunity to participate in the public educational program” (p. 563), districts face increased demand to provide suitable services for academic achievement to this growing student population.

The New Jersey Department of Education (2008) defines LEP students as “students from pre-kindergarten through grade 12 whose native language is other than English and who have sufficient difficulty speaking, reading, writing, or understanding the English language, as measured by an English language proficiency test, so as to be denied the opportunity to learn successfully in the classrooms where the language of instruction is English.” As defined, research refers to these students as English Language Learners, English Learners, English as a Second Language and Limited English Proficiency students. While the U.S. government compels every school district that has more than 5 percent national-origin minority children with no or limited English proficiency to “take affirmative steps to rectify the language deficiency in order to open its instructional program to these students,” Section 9101 of Title IX Elementary and Secondary federal statute allows school districts to determine whether a child is categorized as LEP (EEOA, 1974). As a gesture of flexibility, NCLB regulations permit a State to exempt students who recently arrived to the United States and are limited in English from one administration of the state's reading/language arts assessment. And while states are required to

include recently arrived LEP students in State mathematics and science assessments, NCLB regulations permit states to not count, the scores of recently arrived LEP students on State mathematics and/or reading/language arts (if taken) towards their Adequate Yearly Progress (AYP) determinations (USDOE, 2006).

LEP students are the fastest growing segment of the student population in public schools in the United States (NJDOE, 2008). According to the National Clearinghouse for English Language Acquisition and Language Instruction Educational Programs (2011), approximately 5.3 million LEP students were enrolled in pre K–12 in 2008/09, accounting for about 10.8 percent of public school students in the United States (Planty et al., 2009). National enrollment of LEP students in public schools grew 57 percent between 1995 and 2009 (Flannery, 2009)—almost six times the 10 percent growth rate in the general education population (students not enrolled in a language assistance program or a special education program). Similarly, the number of LEP students in New Jersey has been growing, in conjunction with a rise in foreign-born residents in the state. In 2009, people born in other countries accounted for over 20 percent of New Jersey’s population (Migration Policy Institute, 2010b).

No part of the country remains unaffected by the large increase in ELLs. Even Appalachia has experienced an influx of students from a wide variety of language backgrounds—among them, Spanish, Serbian, Vietnamese, Japanese, and Arabic (Marcus, Adger, & Arteagoitia, 2007). Most ELLs were born in the United States. Seventy-six percent of elementary-age ELLs were born in the United States, as were 56 percent of ELLs in middle through high school. In fact, the parents of about one-fifth of ELLs were also born in the United States (Capps, Fix, Murray, Passel, & Herwanto, 2005). Nationally, if an ELL student communicates in English with difficulty there is an 82% likelihood that he will not graduate from

high school. During the 2007-2008 academic year only 11 states met their ELL accountability endeavors under the No Child Left Behind Act (Zehr, 2011). A Texas study reported that 80% of ELLs did not graduate from high school (Echevarria & Short, 2010). Research states that ELLs that attend middle and high schools have become long term ELL. Their individual learning needs required for success in school are largely ignored, therefore creating an underperforming group of ELL students (Olsen, 2010). While studies of the schooling experience of emergent bilingual secondary students have been generated (Suárez-Orozco, Suárez-Orozco, & Todorova, 2008), research about these students remains limited overall, as studies of emergent bilinguals typically focus on elementary students. As a result, secondary emergent bilinguals have been deemed 'overlooked and underserved' both in research as well as in educational practices (Short & Fitzsimmons, 2007; Rance-Roney, 2009). Especially at the secondary level, wide disparities are apparent between Limited English Proficient students and others. For instance, these students are disproportionately represented in national rates of dropout, grade retention, and course failure (Menken, 2008). Research also reveals that a large number of ELLs reach an intermediate level of English proficiency after a few years, and then cease to make additional gains, meaning that they can engage in conversational English but falter in their ability to apply grammar, structures and specialized vocabularies of English that are required for grade level coursework. Therefore, these students continue to underperform on state tests in English language arts, mathematics and science (Clark, 2009).

Research finds the gap in academic achievement between middle and secondary general education students and those from culturally and linguistically diverse groups has widened primarily because many teachers are underprepared to make content comprehensible for ELLs or teach initial or content-area literacy to this population of ELLs (Echevarria, 2008, Echevarria &

Short, 2010; Echevarria, Vogt, & Short, 2008). Researchers associate what teachers know and are able to do academically and pedagogically and assert that this combination is essential to what students learn (Darling & Hammond, 2008; Honavar, 2008). Standardized assessments evaluate schools based on the percentage of students performing above a proficient score and with the rise of this accountability measure, teachers are faced with the short-term incentive to focus on “bubble” students, those close to the proficiency cut score, especially when increasing a small number of students’ scores can improve the school’s accountability rating. This practice, known as educational triage, may have important implications for educational stratification (Sohn, 2014). Other qualitative and survey studies have found that educators focus more attention on students close to proficiency when they face accountability pressure (Booher-Jennings 2005; Hamilton et al. 2007; Weitz, White, & Rosenbaum 2007), sometimes to the detriment of the lowest performing students.

From 2002/03 to 2008/09, LEP student enrollment in New Jersey public schools increased 6.6 percent, whereas total student enrollment increased less than 1 percent. During that period, LEP student enrollment increased from 4.5 percent of total student enrollment in 2002/03 to 4.7 percent in 2008/09. LEP students in New Jersey spoke 187 languages in 2008/09, up from 151 in 2002/03. In 2008/09, Spanish (spoken by 66.8 percent of LEP students in the state) had the most speakers, followed by Arabic (2.6 percent), Korean (2.5 percent), and Portuguese (2.0 percent) (NJDOE, 2011). In 2008/09, the achievement gap in grade 11 math between LEP and general education students increased 3.3 percentage points, from 52.2 percentage points to 55.5. The average achievement gap in math between LEP and general education students increased to 51.6 percentage points (O’Conner, Abedi & Tung, 2012). An explanation of the difference between English and math percentage points is that English proficiency levels are associated

with performance on solving word problems (Beal, Adams, & Cohen 2010), and the assessments include greater emphasis on word problems than on computational exercises. The addition of more word problems on the math assessment increases the linguistic complexity of the assessment.

Percentage of Students with Disabilities

An NCLB (2002) goal of closing achievement gaps by 2014 between student groups historically at risk for low achievement, relative to the general student population, called for states to examine Annual Yearly Progress (AYP) by evaluating both the performance of all students relative to the grade-level proficiency standards, and the performance of disaggregated student groups which included students with disabilities (SWD). Many states reported that this disaggregate group participated in their state assessments and that 70% of SWDs performed below proficiency on annual statewide reading and mathematics tests (Center on Education Policy, 2009 and Thurlow et al., 2008). Eckes and Swando (2009), found that the most frequent reason for schools' AYP failure was the performance of the SWD group. The Race To The Top (RTTT) legislation (U.S. Department of Education, 2009) introduced greater flexibility in NCLB requirements for state accountability, including the use of growth models to examine not only current year performance of students but also the degree to which student achievement is progressing toward expectations (Manna & Ryan, 2011).

Knowledge about early development of mathematics skills and abilities is limited (Carlson, Jenkins, Bitterman, & Keller, 2011), with even less information available about the developmental trajectories of mathematics achievement, especially for disaggregated groups including SWDs. Studies document a significant gap in mathematics achievement between

students with and without disabilities (Council for Exceptional Children, 2013 and Watson and Gable, 2013). The 2013 National Assessment of Educational Progress (NAEP) mathematics test, in comparison to students without disabilities (SWoDs), indicated much lower percentages of SWDs demonstrated performance at or above “proficient” in Grade 4 (18% vs. 45%) and Grade 8 (9% vs. 39%; U.S. Department of Education, 2013). This gap is further documented on a variety of academic achievement tests. Specifically, researchers have consistently noted the lower mathematics performance of SWDs and differences in skills and abilities that may persist from early learning through later grades (Carlson et al., 2011, LoGerfo et al., 2006, Morgan et al., 2009, Princiotta et al., 2006, Shin et al., 2013 and Wei et al., 2013). Much of the research-based knowledge about mathematics achievement growth and gaps are small, nonrepresentative samples (Geary et al., 2012), notational databases (Carlson et al., 2011, Morgan et al., 2009 and Wei et al., 2013), and aggregated groups. Stevens et al, (2015) found that achievement growth over Grades 3 to 7 was best represented as a curvilinear function with achievement growth decelerating over time. However, the rate of curvature was quite small both in an absolute sense for scale score units and in terms of the percentage of variance explained by the curvature term. These results generally confirm those of other studies (Bloom et al., 2008, Morgan et al., 2009, Morgan et al., 2011, Shin et al., 2013 and Wei et al., 2013) that all reported curvilinear mathematics growth functions with decelerating growth over age or grade.

Relatively few investigators of mathematics achievement have explored the impact of socio-demographic variables on growth or change in achievement gaps for SWDs (Stevens et al., 2015). In a study of mathematics learning disabilities, Judge and Watson (2011) found that students participating in The Early Childhood Longitudinal Study (ECLS-K) had significantly slower achievement growth over Grades K to 5 if they were female, African American, Hispanic,

or lower SES. In another analysis of ECLS-K respondents, Morgan et al. (2009) found that non-White, female, lower SES students identified with an individualized education plan (IEP) scored significantly lower on initial status and had slower mathematics growth rates over Grades 1 to 5 than peers. In a larger study of ECLS-K participants, Morgan et al. (2011) reported that children identified with speech impairments or learning disabilities, who were from lower socioeconomic status families or were African American, had lower levels of mathematics achievement and lagged increasingly behind in their acquisition of mathematics skills over time.

Although the education literature on learning disabilities and on second-language acquisition is extensive, little is known about the characteristics of English learner students with learning disabilities (Shore & Sabatini, 2009; Klingner, Artiles, & Méndez Barletta, 2006). Schools, districts and states struggle with this issue, and some English learner students fail to receive effective support services because the nature of their academic difficulties is misidentified (Sánchez, Parker, Akbayin, & McTigue, 2010; Zehler et al, 2003). There is evidence of English learner students being both over- and underrepresented in special education programs (Rueda & Windmueller, 2006; Sullivan, 2011; Sullivan & Bal, 2013).

Many researchers have pointed out limitations of the IQ–achievement discrepancy model, the first being the wait for the test scores resulting in a delay of services (Burr, Haas & Ferriere, 2015). English learner students, who are learning simultaneously both content and the English language, tend initially to achieve low scores on all English-based standardized assessments, including general intelligence tests (Buttner & Hasselhorn, 2011; Huang, Clark, Milczarski, & Raby, 2011). Some studies question the reliability of IQ tests (Stuebing, Barth, Molfese, Weiss, & Fletcher, 2009) and standardized tests (Abedi, 2006, 2007, 2010) for determining whether an English learner student has a learning disability (Buttner & Hasselhorn, 2011). Standardized test

scores alone cannot distinguish between learning disabilities and other factors—such as a student’s low level of proficiency (especially literacy) in his or her first language, limited prior schooling, and low levels of English proficiency—that may cause an English learner student to perform below standards (Abedi, 2006; Chu & Flores, 2011; MacSwan & Rolstad, 2006). Further, these tests can include a bias that favors U.S. English-speaking culture (Huang et al., 2011). Standardized tests cannot distinguish between learning disabilities and poor-quality teaching (Klingner & Harry, 2006). Some researchers have found that dependence on standardized tests to identify English learner students with learning disabilities has culminated in underdiagnoses in the earlier elementary grades and overdiagnoses in the later elementary grades and above (Gallego, Zamora Duran, & Reyes, 2006; Sullivan, 2011; Valenzuela, Copeland, Qi, & Park, 2006). These misdiagnoses likely result in classroom and program misplacement, which delays the educational achievement of these English learner students (Rivera et al., 2008, Sullivan, 2011; Valenzuela et al., 2006).

Although NCLB (2002) treats SWDs as one undifferentiated group, specific exceptionality categories represent very different kinds of learners whose average performance may differ significantly (Geary et al., 2012, Morgan et al., 2011 and Wei et al., 2013). For example, in a meta-analysis of characteristics of different exceptionality groups, Sabornie, Cullinan, Osborne, and Brock (2005) found that compared to students with emotional/behavioral disabilities, students with mild intellectual disabilities, on average, scored two thirds of a standard deviation lower in academic achievement. Similarly, Morgan et al. (2011) found that, in fifth grade, students with speech-language impairments were approximately one half standard deviation below students without disabilities (SWoDs), whereas students with learning disabilities were more than one standard deviation below SWoDs. So, although NCLB focuses

on the achievement gap for SWDs as a whole, it is important to investigate and document the extent to which the achievement gap differs for specific exceptionality groups (Stevens et al., 2015). Longitudinal studies have found increases in achievement gaps over time using district, state, and federal mathematics and reading assessments (Geary et al., 2012, Judge & Watson, 2011, Morgan et al., 2011 and Wei et al., 2013). Researchers have also reported decreases in the achievement gap, again across a variety of mathematics and reading assessments including district, state, and federal tests (Galindo, 2010, Han, 2008 and Protopapas et al., 2011). Few studies have examined achievement growth for specific groups of exceptional children including SWD and Academically/Intellectually Gifted (AIG) students. Investigators (Shin et al., 2013) examined mathematics achievement growth trajectories using a dichotomous categorization of SWDs vs. SWoDs. Other investigators have examined one or two specific exceptionalities—most commonly speech-language impairment, specific learning disabilities (LD), or both conditions. Judge and Watson (2011) investigated mathematics achievement growth of students with specific learning disabilities using data from ECLS-K over Grades K to 5. Results showed that lower levels of mathematics achievement were already present at kindergarten entry for students identified as learning disabled and these students had slower growth than SWoDs. Morgan et al. (2011), in a study of ECLS-K participants, found that children identified with either speech-language impairments or learning disabilities performed significantly lower than children without disabilities at kindergarten entry but only children with learning disabilities showed significantly slower mathematics growth than SWoDs across the elementary school grades.

Investigators rarely have examined achievement growth in multiple disability categories (e.g., Wei et al., 2011 and Wei et al., 2013), but when they have, considerable heterogeneity

appears in intercept and some heterogeneity in slope of growth trajectories for different exceptionalities. Wei et al. (2013), using the nationally representative Special Education Elementary Longitudinal Study (SEELS), estimated mathematics achievement growth trajectories for students in 11 specific disability categories from age 7 to 17 using quadratic growth models. Wei et al. (2013) did not provide direct comparisons of exceptional children's growth to SWoDs as those students were not included in the SEELS sample. Instead, students with learning disabilities, who constituted the largest proportion of the sample, were the reference group in statistical analyses.

Overall, mathematics growth for all SWDs followed a pattern similar to that observed in previous studies of SWoDs (Lee, 2010) with curvilinear growth that progressively decelerated through high school. The SEELS outcome measures assessed applied mathematics and mathematics calculation. On the applied mathematics measure at the midpoint of the age range, Wei et al. (2013) found that average performance (intercepts) of students in all disability categories was significantly lower than students with learning disabilities (the reference group) with the exception of students with speech impairments, emotional disturbance, or visual impairments. The ranking of disability groups from highest to lowest average performance was speech impairments, visual impairments, emotional disturbances, learning disabilities, other health impairments, orthopedic impairments, hearing impairments, traumatic brain injury, autism, intellectual disability, and multiple disabilities. In contrast, there were no statistically significant differences between students with learning disabilities and students in each of the other disability categories on slope or acceleration of growth trajectories. On the mathematics calculation outcome measure, Wei et al. (2013) found that, on average, students with autism, intellectual disabilities, traumatic brain injury, or multiple disabilities had significantly lower

scores and students with speech impairments had significantly higher scores in comparison to students with learning disabilities. Wei et al. (2013) found no statistically significant differences in slope or acceleration of calculation scores between students with learning disabilities and students in each of the other disability categories, with the exception of a significantly slower growth rate for students with autism and a significantly faster deceleration for students with speech impairments.

In one of the few studies of achievement growth in Academically/Intellectually Gifted (AIG) students, Ma (2005) used data from the Longitudinal Study of American Youth over Grades 7 to 12 and found that provision of an early, accelerated mathematics curriculum resulted in little improvement in mathematics growth among AIG students, small improvements among honors students, and larger improvements among GE students. Ma provided evidence that ceiling effects, a common problem in the study of academic growth in AIG students, did not affect the outcome measure. In another study, Rambo-Hernandez and McCoach (2014) found that, on the Measures of Academic Progress (MAP) reading test (Northwest Evaluation Association, 2011), average students' initial performance in Grade 3 was lower than AIG students, but average students had greater growth during the school year and through to the fall of Grade 6. AIG students, however, grew more quickly than average students over the summer and maintained the same growth rate throughout the calendar year.

Academic achievement is typically defined as proficiency in reading and mathematics, has consistently been identified as a predictor of post-school success, including social inclusion, economic self-sufficiency, and overall quality of life (Kutner et al., 2007). Erickson et al. (2014) “tested a structural equation model to explore the direct relationship between self-determination

and academic achievement for adolescents with intellectual disabilities.” The results indicated positive correlations among self-determination, reading achievement and math achievement in a nationally representative sample of youth with intellectual disabilities. Zheng et al. (2014) established similar findings in regards to students with learning disabilities. Despite research showing positive correlations between self-determination and adult outcomes for students with intellectual disabilities (Arndt et al., 2006), self-determination skills are still not consistently taught in schools (Wehmeyer, Agran, & Hughes, 2000). For students with intellectual disabilities, self-determination interventions have been repeatedly shown to improve academic skills such as productivity and organization (Fowler et al., 2007). This result begins to address the “paucity of research on self-determination interventions on academic performance of [students with intellectual disabilities]” (Fowler et al., 2007, p. 282). As increasing attention is given to college and career readiness for all students, schools should consider self-determination instruction alongside the academic curriculum and provide opportunities for students to exercise their self-determination skills (Erickson et al., 2015). Wehmeyer, Abery, et al. (2011) point out that, “becoming more self-determined is a critical milestone for adolescent development.”

Socioeconomic Status

Socioeconomic status (SES) is an economic and sociological combined total measure of a person's work experience and of an individual's or family's economic and social position in relation to others, based on income, education, and occupation (NCES, 2008). Family socioeconomic status is one of the strongest and most robust predictors of academic achievement and, ultimately, educational attainment for students. In fact, Sirin (2005) notes that family SES is “probably the most widely used contextual variable in education research” (p. 417). The SES-achievement gap is evident not only in youths' performance on standardized tests (Duncan &

Magnuson, 2011), but also in years of completed schooling and degree attainment (Bailey & Dynarski, 2011).

A family's SES has conventionally been treated as static rather than dynamic (Barr, 2015). That is, family SES at one point in time, particularly in childhood, has been used to predict a variety of educational outcomes including links between health and socioeconomic status in childhood and health and employment status at older ages, finding that early life socioeconomic status is significantly associated with health over the life course (Case & Paxson, 2011), links between SES and a child's prenatal year and fifth birthday, finding detrimental effects of early poverty on a number of attainment-related outcomes such as adult earnings, work hours, receipt of transfer income and some health outcomes such as adult body mass (Duncan et al., 2010) and the impact of early environments on child, adolescent, and adult achievement (Heckman, 2006). Such work either assumes family SES to be relatively stable or assumes an importance of baseline levels of SES independent of any change that may occur (Barr, 2015). Recent developments, however, suggest that the temporal elements of SES may be central to understanding mechanisms of inequality (DiPrete & Eirich, 2006; Mollborn et al., 2014). It is unclear, then, the extent to which initial levels of family SES impact trajectories of academic achievement, independent of change in family SES, or the extent to which *changes* in family SES, independent of baseline levels, matter in the achievement process (Barr, 2015).

High school, being the critical juncture in a students' life, serves as an important indicator for the future. Slowed or declining academic achievement at this stage in a student's education might yield substantial trajectory-altering implications for adulthood (Altonji et al., 2012). Health problems among students' parents may become more prevalent and may begin to manifest themselves in more noticeable ways during high school due to caregivers entering middle-age

(Geronimus et al., 2006). The SES-achievement gap is particularly wide for mathematics (Reardon, 2011), and it appears that falling behind in mathematics knowledge is a particularly difficult gap to close (Reardon & Galindo, 2009).

Mathematics achievement plays a unique role in the status attainment process (Ritchie & Bates, 2013), as it portends success in professional fields of study that are in high demand in the labor market (National Mathematics Advisory Panel, 2008; Sadler & Tai, 2007). Barr (2015) found that higher SES students saw larger gains in mathematics achievement across the first 3 years of high school than did their lower SES peers. Ritchie and Bates (2013) found that mathematic abilities at age 7 were substantially and positively associated with SES at age 42, independent of relevant confounding variables. The importance of mathematics achievement has been recognized by educators and policy makers in the United States, as they have quickly raised the bar for mathematics courses and skills acquisition, particularly in middle and high school (Domina & Saldana, 2012). Their analyses indicate that race, class, and skills gaps in geometry, Algebra II, and trigonometry completion have narrowed considerably from the 1982, 1992 to 2004 study period. However, consistent with the theory of maximally maintained inequality, inequalities in calculus completion remain pronounced (Domina & Saldana, 2012).

A stratified, two-stage random sample served as a national representative of 9th grade students in 2009-2010 and schools with 9th and 11th grade students in 2009, found that 9th grade family SES was negatively associated with SES gains across high school. Thus far, a 9th grade student's family SES, independent of any change in family circumstances, has proven important in predicting family health problems and mathematics achievement gains across high school. The academic consequences of poor parental health are not well understood, but the current findings complement those by Boardman et al. (2012) in suggesting that this relational process may be an

additional mechanism underlying the intergenerational transmission of socioeconomic status. Given that status attainment also has significant implications for health and well-being in adulthood (Montez & Friedman, 2015). It is incumbent upon us to understand more fully this potential cascade of intersecting inequalities not only across an individual's life course but also between generations if we are to disrupt these “chains of disadvantage” (Umberson et al., 2014) that perpetuate socioeconomic and health disparities.

Faculty Attendance

Teachers are the most important school-based determinant of students' academic success (Clotfeller, Ladd & Vigdor, 2007) and studies have documented negative relationships between teacher absence and student achievement (Caruso, Cassel, & Blumsack, 2009; Clotfeller, Ladd, & Vigdor, 2007; Herrmann & Rockoff, 2010; Keller, 2008a, b; Miller, 2008; Miller, Murnane, & Willett, 2008a,b; Rothstein, 2010; Sawchuck, 2008). The National Center for Education Statistics, “2003-2004 Schools and Staffing Survey” result is considered by the Department of Education, to be a “leading indicator” of student achievement (NJDOE, 2012). Research found that every 10 teacher absences lowers average student mathematics achievement equivalent to the difference between having a novice teacher and one with a bit more experience (Clotfeller, 2007). Miller et al. (2008) and Clotfeller et al. (2009) estimated that 10 additional days of teacher absences reduced student achievement by 1-3% of a standard deviation (SD) in an anonymous large urban school district in the northern part of the United States and in North Carolina, respectively. Other studies have documented small negative relationships between teacher absences and student achievement, but a continuing belief in the importance of the problem has led some researchers and policy makers to focus on reducing teacher absence (Keller, 2008a,b; Rogers & Vegas, 2009). For example, Duflo and Hanna (2006) and Duflo et al. (2010) reported

findings from a randomized experiment testing the extent to which monitoring (i.e., a student photographed the teacher at the beginning and end of the school day) and incentives decreased teacher absence and increased student learning (0.17 SD) in rural India. They found that absenteeism by teachers decreased and students' test scores increased as a result of strong responses to the salary incentives and "that this alone can explain the difference between the groups" (Duflo et al., 2010).

Other studies failed to find any significant relationship between teacher absenteeism and student achievement (Clay, 2007, Miller, 2006 & Colquitt, 2009). Teacher absenteeism did not have a negative effect on student achievement; however other characteristics (e.g., degree level and certification) were significant predictors of norm-referenced and criterion-referenced test performance.

Educators, policy makers, and the general public maintain interest regarding teacher absenteeism and its relationship to student achievement (Caruso, Cassel, & Blumsack, 2009; Clotfelter, Ladd, & Vigdor, 2007; Herrmann & Rockoff, 2010; Keller, 2008a,b; Miller, 2008; Miller, Murnane, & Willett, 2008a,b; Rothstein, 2010; Sawchuck, 2008). The 5.3 percent rate of absence for American teachers (Miller, 2012) continues to encourage researchers to document how often and why teachers are absent in the United States and other countries. While Eswaran and Singh (2008) studied the variety of reasons for teacher absences, Herrmann and Rockoff (2010) researched the impact of these absences, and Miller (2008) researched the building-level professional norms around absence. Research regarding the costs of teacher absenteeism (Miller, 2008; Roza, 2007; Sawchuk, 2008), and the correlational, causal-comparative, and experimental influences of teachers missing school (Clotfelter, Ladd, & Vigdor, 2009; Duflo &

Hanna, 2006; Duflo, Hanna, & Ryan, 2010; Findlayson, 2009; Hansen, 2009; Jacob, 2011; Miller, 2008) expands on the study of teacher absences. As Clotfelter et al. (2007) argue, "common sense suggests that teacher absences will impede students' academic progress"; and the simple logic sustaining interest in teacher absence is the belief that "teachers cannot instruct if they are not in school" and the "potential policy implications" for developing district policies to address the "distribution of teacher absences" (Miller et al., 2008a, p. 181).

Students in schools serving predominantly low-income families tend to endure teacher absence at a higher rate than students in more affluent communities (Clotfelter, Ladd & Vigdor, 2007) thus; it's plausible that achievement gaps can be attributed, in part, to a teacher attendance gap. Rosenblatt and Shirom (2005) found that absence frequencies were similar for male and female teachers and some personal characteristics (e.g., number of children in teacher's family, salary), but different for age, level of education, and professional position. In "Tales of Teacher Absence," Miller (2008) summarized causes and consequences of teacher absence.

Characteristics of teachers (e.g., female teachers and teachers who commute long distances) and schools (e.g., elementary schools, large schools, and schools with large numbers of students at-risk) as well as general factors (e.g., days of the week, illnesses, how missing school is addressed by administrators) were among factors predictive of higher absence rates. Financial costs, lost learning, and continuing gaps in achievement for schools enrolling large numbers of at-risk students were among reasons provided for why teacher absence matters. Patterns of teacher absence and relationships between them and student achievement support findings of Miller (2008) and others, but also add to the knowledge base:

1. Students in middle school were more likely to experience high rates of teacher absence than their peers in elementary or high schools.

2. Relationships between teacher absences and student academic achievement across the district were very low when we reviewed at school or grade levels and subjects; and, although the relationships were statistically significantly different from zero, the effect sizes were close to zero for all single-level correlations.
3. In multi-level analyses, the relationship between teacher absences and standardized achievement scores was negative. The more teacher absence, the lower their student standardized achievement scores.
4. In general, school effects for teacher absence were also predictors of student achievement in addition to teacher effects and a variety of other factors that were potentially important in explaining achievement gaps, including quality and availability of substitute teachers, specific subject areas in which teacher absences occur, the quality of teachers in a school, and the specific reason for teacher absences (Miller, 2008; Rockhoff, 2004; Rothstein, 2010).

Faculty Credentials

Teacher quality is an important determinant of student achievement, but while teachers have large effects on student achievement, the research evidence provides little indication how teacher quality can be enhanced. According to economics literature, education is important for economic growth (Hanushek & Woessmann, 2010). Studies document a larger, positive relationship between student achievement (reflecting cognitive ability) and economic growth (Hanushek & Woessmann, 2008). Researchers argue that failing to raise national levels of student achievement can ultimately cause economies to stagnate (Hanushek & Woessmann, 2010; Hanushek & Woessmann, 2012). An important factor in raising student achievement is teacher quality (Hanushek & Rivkin, 2010). Studies show that a student improves three times

more in his or her academic achievement when taught by a high quality teacher (relative to a low quality teacher) (Hanushek, 2011). Studies out of developing countries documented how variation in teacher quality can lead to substantial differences in student achievement (Kingdon & Teal, 2010). Policymakers and researchers seek to identify specific teacher credentials that signal teacher quality (and raise student achievement). Researchers have established that educational background (Harris and Sass, 2011; Kukla-Acevedo, 2009) and professional certifications (for example, fulfilling professional teaching requirements set by a national agency) (Clotfelter et al., 2007, Harris and Sass, 2009; Boyd et al., 2006).

Although the increasing availability of longitudinal administrative test data for students in Grades 3-8 has generated a number of studies investigating how teacher credentials affect student achievement in elementary school (Clotfelter, Ladd, & Vigdor 2006, 2007a, 2007b; Goldhaber & Anthony 2007; Rockoff 2004), much less research has been done at the high school level. Research found that subject-specific certification, particularly in math and English, generates higher student achievement. Certification such as the National Board Certification generates positive effects, and at least during their initial years of teaching, lateral entry teachers on average are less effective than teachers with regular licenses (Clotfelter, Ladd, Vigdor & Jacob, 2010).

More research is needed on the relationship between teacher credentials and student achievement in high schools, especially in the core courses taken early in a student's high school career (Clotfelter, Ladd, Vigdor & Jacob, 2010). Due to urban districts educating a larger amount of low income, at-risk students and higher qualified teachers opting to work in suburban districts, often low income urban neighborhoods employ teachers with low qualifications and weak academic credentials to instruct disproportionate shares of low income and at-risk students

(Murnane & Steele, 2007). These poorly prepared teachers have difficulties in the classroom and often leave the teaching profession or transfer to less arduous duty in suburban schools (Buddin & Zamarro, 2009).

Jacob and Lefgren (2008) examine how differences in teacher quality affected student achievement in a midsized school district. Like Rivkin et al. (2005), they find large differences in value-added measures of teacher effectiveness (teacher heterogeneity) but small effects of teacher qualifications like experience and education. They find that school principal rankings of teachers are better predictors of teacher performance than are observed teacher qualifications. Harris and Sass (2006) examine how teacher qualifications and in-service training affected student achievement in Florida. They use a value-added gains model that controls for student and teacher fixed effects. They find small effects of experience and educational background on teacher performance. In addition, they find that a teacher's college major or scholastic aptitude (SAT or ACT score) is unrelated to their classroom performance. Clotfelter et al. (2007) finds fairly similar parameter estimates for a variety of value-added models for elementary students and teachers in North Carolina. They find that teacher experience, education, and licensure test scores have positive effects on student achievement. These effects are large (relative to socio-economic characteristics) for math, but the effects are smaller in reading. Goldhaber (2007) also focuses on elementary students in North Carolina. He finds a small effect of teacher licensure test scores on student achievement. He estimates a value-added gains score model with lagged test score as a regressor. The author argues that raising the passing cut score would substantially reduce the pool of eligible teachers in North Carolina without having a substantial effect on student achievement scores. Aaronson et al. (2007) looks at teacher quality and student achievement in Chicago public schools. Their study uses a gains score approach with controls for

student and teacher fixed effects. The results show strong effects of teachers on student achievement, but traditional measures of teacher qualifications like education, experience, and credential type have little effect on classroom results. Koedel and Betts (2007) use a value-added gains model to look at student achievement of elementary students in San Diego. Like several of the other studies, they find that teacher quality is an important predictor of student achievement, but measured teacher qualifications (experience, quality of undergraduate college, education level, and college major) have little effect on student achievement.

Similar to a number of recent studies on the effects of teacher credentials, Chu et al. (2015) used an identification strategy which relies on a cross-subject student-fixed effects model (Kingdon & Teal, 2010; Van Klaveren, 2011; Clotfelter et al., 2010; Dee, 2005; Dee, 2007). In this study, a student-fixed effects model was used to estimate the impact of teacher credentials on student achievement in the context of the biggest education system in the world—China. Researchers found that having a teacher with the highest rank does improve student achievement (relative to having a teacher who has not achieved the highest rank) by approximately 0.20 standard deviations. Further, teacher rank especially benefits economically poor students. However, no evidence was found regarding teacher rank associating with increased teacher effort. In addition, once accounting for teacher rank, whether a teacher attends college or holds teaching awards does not appear to provide additional information on whether a teacher can improve student achievement.

Faculty Mobility

Individuals enter the teaching profession because they have determined that the compensation, benefit levels, working conditions, and intrinsic value of teaching provide the best employment opportunity out of all their available options (Guarino, Santibañez & Daley, 2006).

Teachers who (1) teach in areas for which they are certified, (2) teach fewer students with disabilities and labeled low achievers, (3) teach in communities with average socio-economic status (low poverty), and (4) believe themselves to be competent and effective are reportedly more satisfied (Guarino, Santibanez & Daley, 2006).

A U-shaped curve is plotted against age or experience when concerning attrition (Guarino et al., 2006). Teachers that are young, new to the profession young, or are nearing retirement age (Hanushek, Kain, & Rivkin, 2004; Ingersoll, 2001) are most likely to leave the profession. Boyd et al. (2005) revealed that intra-district mobility takes place as often as teacher exits. High-poverty schools typically lose 20% or more of their teaching faculty each year, and studies find more than 50% of teaching staff must be replaced every 5 years; by comparison, these rates are roughly 50% higher than low-poverty schools (Simon & Johnson, 2013). The systemic loss of teachers that change occupations, or schools, on a national level, stand at 7.7% (Hightower et al., 2011). That’s close to “0.2 million teachers who stop teaching every year, and nearly as many teachers that move from one school to another” (US DOE, 2004).

Public school teachers, in comparison to private school teachers are more likely to leave teaching, although teachers from both sectors are equally likely to change schools (Luekens et al., 2004). Although many factors have contributed to overall teacher attrition and mobility, most novices leave the profession because of low salaries, student discipline problems, lack of support, poor working conditions, inadequate preparation, and little opportunity to participate in decision making (Cochran-Smith, 2004; Liu & Meyer, 2005). High mobility schools, particularly urban schools and schools with a high share of students eligible for the school lunch program, appear to also have lower student achievement in reading and math (Kane & Staiger, 2008; Levy, Jablonski, & Fields, 2006; Levy, Joy, Ellis, Jablonski, & Karelitz, 2012; Rivkin,

Hanushek, & Kain, 2005; Ronfeldt et al., 2013). Studies in both North Carolina and New York indicated that schools with greater percentages of minority and poor students usually had fewer qualified teachers (Lankford, Loeb & Wyckoff, 2002; Clotfelter, Ladd & Vigdor 2005). Teachers with stronger academic training appear to be especially prone to leaving disadvantaged school settings (Boyd, Lankford, Loeb & Wyckoff, 2005). It was very likely that teachers in these disadvantaged schools would transfer to a new school district (Ingersoll, 2001; Imazeki, 2004; Hanushek, Kain & Rivkin, 2004). Due to the predominance of high-stakes reading and writing assessments for middle and high school students, researchers' study of individuals who teach English or language arts is critical. Burns (2007) concurred, claiming, "teachers, as individuals responsible for increasing student achievement, are directly implicated as a primary source of school failure." Researchers have identified the accountability associated with the No Child Left Behind Act (NCLB; 2002). In a recent study, over 55% of those surveyed indicated an "overemphasis on testing" as an influence on their decision to leave the profession (Hirsch, 2006). As literacy achievement is a central agent for testing in current accountability mandates, literacy teachers and English teachers are particular targets for scrutiny" (Burns, 2007).

Teacher turnover continually draws the attention of policymakers, researchers, and administrators, despite evidence showing that teacher turnover rates are similar to those found in comparable occupations (Harris & Adams, 2007). "Staff turnover always require interviewing, training and productivity costs on an organization, yet in the educational system, turnover can also compromise student learning" (Kukla-Acevedo, 2009). "Teachers generally need to acquire 5 years of experience to become fully effective at improving student performance" (Rivkin, Hanushek & Kain, 2005). "Schools with high turnover rates, such as those located in urban

areas, fill vacant positions with new (inexperienced) teachers” (Lankford, Loeb, & Wyckoff 2002), leading to large groups of less effective teachers among their staff.

One way in which districts and schools can influence turnover is to improve certain working conditions to make a more desirable job environment (Guarino, Santibañez & Daley, 2006). A comfortable physical environment, frequent professional development opportunities, and adequate resources (Kukla-Acevedo, 2009) have been found to contribute to teacher satisfaction. Mentorship of early career teachers may provide a more cost-effective means of reducing turnover. Smith and Ingersoll showed that teachers are less likely to quit when they receive mentoring services during their 1st year of teaching (Kukla-Acevedo, 2009). The literature on job satisfaction suggests that for most professions, having good working relationships with supervisors and colleagues is paramount (Adams, 2010). These good working relationships are forged when school leaders are supportive and interactive; when teachers' voices are heard, not marginalized, in the decisions regarding teaching and learning; when the work day is structured for the occurrence of regular interactions between a network of colleagues; and when the school feels orderly and safe (Adams, 2010; Allensworth, Ponisciak, & Mazzeo, 2009; Feng, 2006; Loeb, Darling-Hammond, & Luczak, 2005). Research findings indicate relationships between job satisfaction and preservice preparation. Teachers graduating from four- and five-year preparation programs "were one-half to two-thirds more likely to stay in the teaching profession" (Anhorn, 2008; Barnes, Crowe, & Schafer, 2007). Gilpin (2011) found a positive relationship between preservice practicum experiences and novice-teacher retention. More specifically, novice teachers who participated in practicum experiences during their preservice preparation were three to six percentage points more likely to remain in the teaching profession.

School Size

The definition of “small” in the literature on school size and outcomes lack consensus. The federal government, through its Small Schools Initiative, set a limit of 300 students (U.S. Department of Education, 2006) while the Gates-funded initiative in NYC considered 500 students the upper limit for small high schools (Gootman, 2005) and a study in Chicago established a 600 student cutoff (Barrow et al., 2010). Research regarding the costs of small high schools in NYC, as well as the then-current local policy, says that schools with 600 students or fewer were considered small (Stiefel et al., 2000). Lee and Smith (1997) found schools in the range of 600– 900 to be most effective for minority students, and a Gates funded study (Bloom et al., 2010) used 550 as the cutoff for a small school.

Leithwood and Jantzi (2009) found that as school size increased so did achievement, with an “inverted U” relationship between size and achievement. Achievement rises with school size up to some optimum school size then begins to decline as school size exceeds this optimum. Within this study, as school size increased, achievement declined; for the studies that permitted its calculation, effect size (ES) ranged from essentially nonexistent ($-.00075$) to medium ($-.30$). Kuziemko (2006) used school-level panel data, and generated first-differences estimates of the effect of school size on achievement. To account for the possibility that trends in both achievement and enrollment size are jointly determined, shocks to enrollment provided by school openings, closings, and mergers in a two-stage-least-squares estimation was utilized. The results suggest that smaller schools increase both math scores and attendance rates and that the benefit of smaller schools outweigh the cost.

An instrumental variables framework using the distance between the nearest small or large school and the student’s home has been used in an educational evaluation of Chicago

schools (Cullen et al., 2005), an evaluation of small schools (Barrow et al., 2010) and charter schools (Booker et al., 2011) in Chicago. This research demonstrated in a variety of contexts, the likelihood of attending a school decreases as the distance to the school increases, perhaps because of higher costs such as those involving transportation. Bloom et al. (2010) studied new small schools that offered admission by lottery and found a 6.8%-point increase in graduation rates from attending these small schools of choice. Schneider et al. (2007) studied the causality issue and expanded their use of statistical methods and experimental designs to address it. Schneider et al. (2007) evaluated small school effects using data from the Educational Longitudinal Study of 2002 (Ingels et al., 2013). They compared estimates from a random coefficients/hierarchical linear model (HLM) to those from a propensity score matching estimator using the available observable covariates. The authors found with both methods that attending a small high school has little effect on achievement, with the hierarchical linear model.

Barrow et al. (2010) used quasi-experimental variation in the distance between students' homes to high schools in an instrumental variables (IV) framework to evaluate the effect on performance of attending small high schools in Chicago. In their IV results, they found a positive effect of small school attendance on continuation through high school and graduation, but their study included only 22 small high schools and could not distinguish among school vintages.

Schwartz, Stiefel, and Wiswall (2013) studied the effect of new small high schools on student outcomes in New York City using distance from student zip codes to the nearest schools by size and age as instrumental variables for attending a new small school, a new large school, an old small school, or an old large school. They found that students who attend one of the new small high schools are 17.5 percentage points more likely to graduate from high school than students who attend a large high school. Further, new small high school students are more likely

to attempt a Regents math or English test by around 16 percentage points. In contrast to the findings of Bloom and Unterman (2012), that the 9th grade small school lottery winners were 10 percentage points more likely to be on track to graduate, were 8.6 percentage points more likely to graduate four years after entering 9th grade and were more likely to score at or above 75 on the English Regents exam; the level at which the City University of New York exempts students from taking remedial English classes, Schwarz et al. (2013) found that new small high school students perform less well on the English Regents' exam than their large high school counterparts although they are also more likely to have taken the exam.

Hastings et al. (2006) find that in North Carolina proximity is highly valued by all, although families with strong preferences for academics are generally willing to tolerate longer distances. More individualized attention and frequent interaction may improve students' sense of belonging and provide focus in schools' curricula and culture (Iatarola, Schwartz, Stiefel & Chellman, 2008). The common features of these high-performing small schools include high expectations, close monitoring, and the use of data driven instruction (Abdulkadiroglu et al, 2013).

Length of the School Day

The current round of time-centered reforms in schools stemmed from the American Recovery and Reinvestment Act (ARRC) of 2009; this legislation provided \$100 billion for education and \$3 billion for School Improvement Grants (SIG) (McMurrer & MacIntosh, 2012). The federal government awarded SIGs to states to redistribute funding to local school districts (Barra, 2011). "The SIG program is 100% federally funded under the American Recovery and Reinvestment Act of 2009 (ARRA) and the Elementary and Secondary Education Act. There is a

total of \$63,338,647 available for the SIG awards over three years” (Schundler, Spicer, Gantwerk, Ochse, 2013).

Schools that were willing to implement an extended time schedule were allocated funds supported by school improvement grants (SIGs) by state education bureaucrats; SIGS are among one of four federally approved school models (Sammalone, 2014). Zimmer et al. (2010) researched various initiatives enacted by the Pittsburgh Public Schools, to improve student performance via extra education and tutoring initiatives. Using longitudinal data on students, the authors document positive effects for mathematics but not for reading. Lavy (2012) finds that spending more time at schools and on key tasks yields an increase of achievement in mathematics, English and sciences; and the effect is much larger for students coming from low socio-economic background and in school whose students have homogenous socio-economic background. Because there are only so many hours in a school day, time is a finite education resource. Since the fledgling years of the United States public school system, structural reforms and interventions aimed at adding time or using time in different ways to influence student learning have been put into place (Tienken & Orlich, 2013). Positive results of remedial high school programmes that lengthened the school day were found for courses targeting younger students (Lang et al., 2009) and implemented outside the US context (Lavy & Schlosser, 2005).

Several studies have made use of international datasets such as IEA-TIMMS and OECD-PISA to explore the between-country variation in total instruction time per year and its relationship with achievement. Lavy (2010) points out, school systems vary widely with respect to the amount of time students are exposed to different subjects. Small effects of instruction time are found by Lee and Barro (2001), who uses a panel of 59 countries, by Wößmann (2003), who analyses TIMMS data and by Lavy (2010), who combines OECD-PISA 2006 data with Israeli

achievement data on 5th and 8th graders and finds slightly higher effects for females. Using the same approach, Rivkin and Schiman (2013) find similar results focusing on PISA 2009.

Moreover, these findings have recently been corroborated by Mandel and Süßmuth (2011) for Germany. Sims (2008) studied a reform in Wisconsin that moved the school start date from September into August, finds positive effects on mathematics test scores, but not on language, while Bellei (2009) evaluates the impact of the Chilean full school day program, concluding that the extended school time seems to have been beneficial both for reading and for mathematics.

Instructional Minutes

Downey (2012) would conduct research measuring the impact of instructional minutes upon achievement within two groups of students, one assigned to ninety minute classes in their core content, the other to fifty-five minute classes in the core content. Through an assessment of scores, teacher interviews, and student surveys, the study would be inconclusive regarding the descriptive statistics, ANCOVAs, and Estimated Marginal Means. However, it would imply strengths inherent within increased time in class, as well as a positive impact upon teacher and student satisfaction. Improvement upon the level of satisfaction of teachers and students alike improves upon the quality of the educational environment, thereby supporting achievement.

Within the educational environment the importance of time has been found throughout a variety of students. When used in conjunction with early intervention efforts such as group size and instructional delivery, time is a feature that may be capitalized upon the substantially improve upon the outcome of education. To test this, at-risk first-graders were studied in regards to their learning progress within the classroom through the application of intensive instructional supports such as instructional time. Through an increase in the instructional time for the at-risk students in the study population, Harn, Linan-Thompson and Roberts (2008) found that

significantly more progress would be made across a number of reading measures. It is recommended that intensive instructional time be applied to at-risk students in practice given the benefits it has upon at-risk students.

In the high-school environment, research by Fisher (2009) explored the relevance of instructional time to the educational experience, and the quality thereof. Through a consideration of fifteen classrooms representing 2,475 minutes, a number of instructional patterns would be established. Of these instructional minutes, it was found that a majority of time spent by students was either on waiting or listening. Amidst the many instructional minutes studied, only a small portion thereof was spent engaged. Such activities as authentic reading, writing, and peer work were participated in only a small percentage of the time. The time spent engaged determines to a considerable extent the degree of student achievement. Given the lackluster level of student performance often reported and the goal of American high-schools to improve upon this, it is important that time is effectively prioritized. Fisher (2009) recommends that students increase the amount of time spent engaged in peer work, reading, and writing, in order to assist in improving upon students' levels of achievement.

The importance of instructional minutes was recently studied by Burns and Sterling Turner (2010), particularly the degree of efficiency therein. It is important to examine closely the instructional efficiency of academic interventions, with the proposed method of measurement being to determine the number of items learned per instructional minute. This method has been criticized in that it does not take into account the maintenance of the skill oftentimes given the means of testing applied. To test this Burns and Sterling-Turner (2010) would seek to follow up upon such measurement tools in order to determine the comprehension of the learned material during instructional minutes.

Burns and Sterling-Turner (2010) assembled a population of twenty-five fourth-grade students. Each student was taught the pronunciation and English translation of twelve words stemming from the international language known as Esperanto. Two instructional conditions were present in the experiment. The first condition was a traditional drill rehearsal with all words unknown, in comparison to the second method, incremental rehearsal, in which one word was unknown and eight were known. The findings would indicate that incremental rehearsal resulted in substantially more words being retained. However, the traditional drill format of instruction was found to be more efficient in initial learning. When maintenance data was capitalized upon however, the two conditions were found to be equally efficient. In future research on instructional minutes it is recommended that the maintenance of instructional interventions and instructional time should be taken into account when determining its efficiency.

Engaged vs. Instructional Time

Fisher (2009) would study the divergence between time engaged in school, and instructional time. To accomplish this focused observation of teaching practices within fifteen high school classrooms comprised of 2,475 minutes were conducted to determine the presence of instructional patterns. A number of such patterns would be revealed through the research, underlining the reality that instructional minutes do not necessarily equal engagement time. A majority of the time students spend in high school was found to require listening and waiting. Within the high school environment, for only a small fraction of the entire day are the students engaged in authentic writing, peer work, and reading. This underlines the reality that while instructional time is of impact upon the achievement of students, the time spent actively engaged during time classified as instructional may vary widely.

Engaged time

There is a substantial body of literature relating to the impact of instructional minutes upon student achievement, with engaged time having been researched as well in relation its influence upon achievement. For high schools to improve upon student achievement, Fisher (2009) advances that through an increased focus upon engaged time as opposed to instructional minutes, student achievement will rise. It is through increased time engaged in reading, writing, and peer work that the level of student achievement desired by schools may be accomplished (Fisher, 2009).

New Jersey Instructional Minutes

The state of New Jersey is one that recognizes the importance of instructional minutes to a significant degree, and is endeavoring to prioritize instructional minutes even more. The state of New Jersey requires a minimum of four hours each day of instructional time, as per N.J. Admin Code tit. 6A, 32-8.3(b), (e). This instructional time does not include recess or lunch periods (Colasanti, 2007). On the elementary level, instructional minutes and time spent in the classroom has been the subject of restructuring and debate in the recent past. To afford for additional instructional time, the Superintendent of the Fair Lawn school district in New Jersey has sought to eliminate non-productive time spent in the school. The importance of instructional minutes is attributed even to elementary school students, who are being denied time spent in recess and other leisure-based activities in the school to provide for additional instructional time. In an effort at meeting state averages of instructional time, a deal would be brokered with the teachers. Teachers agreed, in exchange for a retroactive raise in pay, to provide an additional twenty-five minutes of instructional time each week. This was accomplished through the shortening of teacher lunches and preparation periods (Koeske, 2012).

According to Koeske (2012), in the Fair Lawn district of the state of New Jersey elementary students are lagging substantially behind the national average in regards to instructional time. Conversely, high-school students are well beyond the national average, receiving nearly one and half hours of instructional time more than the state average. According to Superintendent Watson, these instructional minutes have a highly positive effect upon standardized testing. As a result of the additional instructional time afforded to these high-school students, their standardized test scores over the duration of the last three years have risen, in turn increasing access to advanced placement classes (Koeske, 2012).

In recognition of the importance and impact of instructional time upon achievement, the Freehold Regional High School District in New Jersey has introduced a new bell-schedule into the 2012-2013 school year. The impact of the new bell schedule has been to increase the time spent in school each day by five minutes, while through restructuring increases instructional time by sixteen minutes each day as well. According to superintendent Charles Sampson, while the daily number may seem insignificant, over the course of a school year the time adds up into several additional full periods related to a given subject, thereby being impactful (Rossos, 2012).

The increase in instructional time is at the expense of a homeroom period in addition to travelling time between classes. Students are being denied a homeroom period, and are no longer provided five minutes to travel from their first to second class. The change would result in concerns from students related to clubs, extra-curricular activities, socializing, and commuting, although the benefits were viewed by the superintendent as being worth the trade in time. Each period throughout the duration of the day was incrementally increased to provide for additional instructional time on each subject. In total, a ninth grader will experience 195 hours

of additional instructional time than they otherwise would have under the former schedule (Rossos, 2012).

High School Standardized Testing

In the United States the practice of standardized testing has become the norm since the passage of the 2001 No Child Left Behind Act. The NCLB, as will be discussed in depth, established a federal mandate for public schools regarding academic performance. Janz (2011) in an assessment of high school students would find that standardized testing produces a considerable amount of anxiety. The environment context of standardized testing often involves the reconfiguration of the room and disruption of normal activities, in addition to the substantial implications of the results for teachers. Anxiety impacts students' perceptions of standardized testing in addition to their degree of motivation and thereby performance (Janz, 2011). The incorporation of standardized testing is being experienced across the globe, commonly referred to as high-stakes testing. High-stakes testing has been accused of corrupting educational practice in schools, and in addition to this causes a number of additional and unintentional negative consequences (Ryan & Weinstein, 2009). As will be explored, whether anxiety-inducing or not, standardized tests have taken a central position in American education.

New Jersey High School Standardized Testing

High school students in New Jersey are subject to the HSPA, the High School Proficiency Assessment. The test is used to determine the level of student achievement in reading, writing, and mathematics, as specified within the New Jersey Core Curriculum Content Standards, NJCCCS. The purpose of the tests is to ensure that New Jersey students are able to achieve and conform to the nationally prescribed level. To support achievement in core subjects such as mathematics, additional instructional time is being applied to problem-solving and active

learning. The NJCCCS were implemented this year, with the 2012-2013 school-year being the first to experience this transition in assessment systems (State of New Jersey, 2012).

CHAPTER III
METHODOLOGY
Introduction

The purpose of this quasi-experimental study was to investigate the influence of instructional minutes and student achievement on high-stakes tests. The lack of existing quantitative research on the specific topic of instructional minutes encouraged the exploration of the influence on high school student achievement as measured by the NJ HSPA 11 in Language Arts and Mathematics. The study measured the influence of instructional minutes on achievement while controlling for student, school, and staff variables in an aim to produce research-based evidence to assist all stakeholders in public education regarding reform initiatives. This study adds to the existing literature, equipping educators and policy makers with data and evidence to construct informed decision making when considering reform or financing of initiatives that impacts the school schedule.

Research Design

Leech, Barrett and Morgan (2011) explain that correlational research is best used to describe and measure the relationship between two or more variables or sets of scores. The independent variables used in the analyses were the following: student attendance, student mobility, percentage of students with limited English proficiency (LEP), percentage of students with disabilities, socioeconomic status (SES), faculty attendance, faculty credentials, faculty mobility, school size, length of school day and instructional minutes. Since it is mostly improbable to manipulate many variables in educational settings, the need to study independent variables still exists. Therefore, the need for educational researchers to use explanatory studies is acceptable (Johnson, 2001). In order to have an explanatory study, Johnson (2001) propounded

that we must query (a) as the researcher trying to develop or test a theory about a phenomenon to explain “how” and “why” it operates? (b) Was the researcher trying to explain how the phenomenon operates by identifying the causal factor that produces change in it? (p. 9). This study uses a correlational, non-experimental, explanatory design with quantitative methods to determine whether instructional minutes influenced student achievement on high-stakes tests. The regression models facilitated the explanation of the variance in the dependent variable, NJ HSPA 11 scores. Explanations of the results are upheld by the establishment of connections between facts through regularities that are observed (Gelo, Braakmann & Benetka, 2008). This explanatory, non-experimental study used correlational research and hierarchical multiple regression analysis from a single point in time to measure the relationship between two variables: instructional minutes and Grade 11 NJ 2011 HSPA scores. By controlling for the aforementioned predictor variables, as identified by the literature, one can better understand the amount of variability the target variable of interest has on student performance, specifically on the NJ HSPA in LAL and Math. In the hierarchical multiple regression models, a dependent variable is determined from various predictor variables (Leech et al., 2011). It is preferable to use the hierarchical method when one has an idea about the order in which one wants to enter predictors and wants to know how predictions by certain variable improve on prediction by others (Leech et al., 2011). This model helped to determine the statistical significance of the relationship of the student, staff and school variables to the percentage of students who score Proficient and Advanced Proficient on the NJ Grade 11 2011 HSPA. The analysis provided quantitative descriptive research on the relationship of instructional minutes in New Jersey Grade 11 public school students in district factor groups A through J and scores on the NJ Grade 11 2011 HSPA which contributed to identifying significance and strength of the correlation.

Student, school and staff variables were used to identify which had a statistically significant relationship to student achievement through simultaneous multiple regression and hierarchical regression models. The dependent variables were the 2011 New Jersey High School Proficiency Assessment percentage of students who scored Proficient or Advanced Proficient, at the school level, in the subject areas of Language Arts and Mathematics.

Sample Population /Data Source

All data identified for this study pertained to the 326 public comprehensive high schools in New Jersey associated with District Factor Groupings A through J (NJDOE, 2011). Data from students who met the following criteria were included in the study (a) general education programs; (b) received a valid score on both sections of the 2011 NJ HSPA language arts and mathematics test. New Jersey places districts in a District Factor Grouping (DFG) system as a means of ranking school districts by socio economic status (SES), therefore the district range labels represent that an “A” district was among the lowest (poorest) socioeconomic group while a “J” district was among the highest (wealthiest) socioeconomic group (de Angelis, 2014). The population selected for this study included all of the 2010-2011 school year New Jersey, public academic and comprehensive high school, first time Grade 11, along with Grade 12 students who did not pass the assessment in Grade 11, in the A, B, CD, DE, FG, GH, I, or J district factor groups. Purposeful sampling method was used to select the schools to include in this study due to the shared experience of attending a New Jersey high school. All participants were sampled using the same perimeter; 11th grade students or 12th grade students that did not attain proficiency on the NJ HSPA from the previous testing year; this perimeter reduced risk when sampling (Gravetter & Wallnau, 2008). The participants adhered to the same curriculum standards in accordance with the NJCCCS. Differences in school settings, curriculum, and teacher instruction

are influential variables that may impact student achievement on high-stakes testing (Armstrong, 2006; Grissmer, 2001; Popham, 2001). Vocational schools, special services school districts/special education schools, jointures, and charter schools; coded as O, R and V schools under the District Factor Grouping, were excluded from the study to insure all results obtained from the analysis could be attributed to an emblematic district or regional New Jersey public high school. The student populations of these vocational, special service/special education, jointure and charter schools are normally transported from the various surrounding areas, which consequentially impact their DFG. The sample for this study included the schools that attained all required information relating to school, staff, and student variables to the NJDOE.

Table # lists the schools used in the study's sample as listed on the NJDOE website.

(TABLE #- Alphabetized List of Schools in Sample)

Data Collection

The NJDOE website, under community information, DOE Archives, Historical Report Card Data, 2011 New Jersey School Report Card, the Microsoft EXCEL zipped, and Report Card (RC11) provided the data for this study. The NJDOE published the results of the state assessments through newspapers and the online School Report Cards (NJDOE, 2010). This public data was utilized in pursuance of the generalizations that would derive from the sample population in order to make inferences about instructional minutes and NJ NJSPA scores (Babbie, 1990, as cited in Creswell, 2009). Access to this data enables districts, schools and the public to analyze individual schools and overall state results in a timely fashion. The data from the online School Report Card was entered and matched by school, into an EXCEL spreadsheet. This data sheet accounted for all of the 2010-2011 school year New Jersey Grade 11 public high school students in the A through J district factor groups, their 2010-2011 results, the NJ School

Report Card variables and the Free and Reduced-Lunch eligibility variables (NJDOE, 2011).

Despite the open access to this data, the state report system purposely maintains the confidentiality of individual student scores.

Data Analysis

The research study implemented a simultaneous multiple regression analysis, a distinctly predictive design, in which all predictors are entered into the regression equation at the same time. The multiple regression equation reveals whether or not a relationship exist between the predictor variable (independent {x}; student attendance, student mobility, percentage of students with limited English proficiency (LEP), percentage of students with disabilities, percentage of students eligible for free and reduced-price lunch (SES), staff attendance, percentage of staff with master's degree or higher, staff mobility, school size, length of school day, instructional minutes variables) and the criterion variable (dependent {y}; HSPA Language Arts and Mathematics scores) (Witte & Witte, 2007). Hierarchical multiple regressions were used to provide detailed information regarding the variables.

The IBM SPSS statistical software package was implemented in order to run simultaneous multiple regression models. Standard beta coefficients were examined to determine the strength and direction of the relationship between the predictor and outcome variables. Field (2013) parameters used to actuate the statistical significance of a sample was administered. When referencing the power of a study, Field (2013) states that the simplest rule of thumb is that the bigger the sample size, the better: the estimate of R that we get from regression is dependent on the number of predictors, k, and the sample size, N. In fact, expected R for random data is

$k/(N-1)$. . . Obviously for random data we'd want the expected R to be 0 (no effect) and for this to be true we need large samples.

Only public, non-charter, New Jersey high schools were included in the study. Once the list of schools was compiled, schools that did not report all of the pertinent information were deleted. Consequently, there were 3 high schools included in the 2011 Grade 11 Language Arts and Mathematics NJ HSPA dataset. Using Field's (2013) suggested expected R for random data, $k/(N-1)$, all of the computed "expected R" values were close to 0, which satisfied Field's (2013) suggested parameters for random data, therefore the sample yielded adequate power to run all of the analyses.

Research Questions

This study was guided by the following overarching research question: What is the influence of instructional minutes on Grade 11, 2011 New Jersey state-mandated High School Proficiency Assessment (HSPA) scores when controlling for student, school, and staff variables?

Research Question 1: What is the strength and direction of the relationship between instructional minutes on the Grade 11, 2011 New Jersey state-mandated High School Proficiency Assessment (HSPA) scores in Language Arts when controlling for student, school, and staff variables?

Research Question 2: What is the strength and direction of the relationship between instructional minutes on the Grade 11, 2011 New Jersey state-mandated High School Proficiency Assessment (HSPA) scores in Mathematics when controlling for student, school, and staff variables?

Null Hypothesis

Null Hypothesis 1: No statistically significant relationship exists between instructional minutes and school score performance on the 2011 Grade 11 NJ HSPA for the 326 New Jersey high schools as measured by score of Proficient or above.

Null Hypothesis 2: No statistically significant relationship exists between instructional minutes and the Language Arts school score performance on the 2011 Grade 11 NJ HSPA for the 326 New Jersey high schools as measured by Proficient or above.

Null Hypothesis 3: No statistically significant relationship exists between instructional minutes and the Mathematics school score performance on the 2011 Grade 11 NJ HSPA for the 326 New Jersey high schools as measured by Proficient or above.

Instrumentation

The intention of this research was to determine if a significant relationship existed between student and school variables found in the extant literature to influence student achievement and aggregate district student NJ HSPA scores in Grade 11 language arts and mathematics. Instrumentation for the study consisted of proficiency levels on scores for the state test, NJ HSPA in Grade 11. The primary data source for this study was student scores from the language arts and mathematics sections of the NJ HSPA. The NJDOE contracts with Measure Incorporated (MI) to monitor all aspects of the HSPA testing program. The language arts and mathematics sections measure student mastery of grade level core curriculum content standards (CCCS) established by the NJDOE for English and Mathematics at the appropriate grade or level (NJDOE, 2008). The language arts literacy section contains reading and writing activities that

will measure achievements in interpreting, analyzing, and critiquing text. The mathematics section measures the ability for students to solve number and numerical operations; geometry and measurement; patterns and algebra; and data analysis, probability, statistics, and discrete mathematic problems (NJDOE, 2009). The NJ HSPA is a timed test, which allows approximately two and one-half hours each day, over a three-day period to complete the language arts and mathematics portion (NJDOE, 2013).

The reading component of the NJ HSPA Language Arts Literacy section requires students to read passages and to answer related questions about each passage. Most of the test questions are multiple choice; however, some questions require students to provide written responses using their own words, usually in the form of written paragraphs; these questions are referred to as “open-ended” questions. Reading passages are used to test comprehension, both literal and inferential. Literal comprehension is the ability to understand the actual meaning of written words. Inferential comprehension is the ability to use careful reasoning to extend understanding of the communication beyond the literal meaning of the words themselves. Questions are based on those skills that critical readers use to understand, analyze, and evaluate text (NJDOE, 2013).

The writing component requires students to respond to two writing prompts. One prompt presents a topic and requires students to develop an expository essay using an example from literature, history, science, film, or their own lives as support for their ideas. The other prompt provides a topic and requires students to write a persuasive essay based on that topic. These two tasks measure students’ ability to construct meaning in sustained written responses (NJDOE, 2013).

The mathematics section of the NJ HSPA requires students to solve problems of basic mathematics, algebra, and geometry. The mathematics section contains two types of questions. Most questions are multiple choice; students select the correct answer from four choices. The other questions are open-ended and students are required to write their answers or to explain or illustrate how they solve mathematical problems. The mathematics section tests student knowledge of number and numerical operations, geometry and measurement, patterns and algebra, data analysis, probability, statistics, and discrete mathematics (NJDOE, 2013).

The state monitors the administration of the NJ HSPA to ensure all students have an equal opportunity to succeed regardless of the location of the test (NJDOE, 2008). Test security measures are strictly adhered to by the state and school districts must treat the NJ HSPA booklets as secure materials that students only view on appropriate test dates designated by the state. Annually, two weeks prior to test administration, school districts receive testing materials. School districts must guarantee NJ HSPA test materials are stored in a secure location, properly accounted for when distributed and returned for testing purposes. Any type of discrepancies must be filed with the state, which provides the paperwork for reporting any issues and accounting for all testing materials. The state handles the distribution and pick up of all test booklets and answer keys. The site test coordinator for the school or district, is responsible for the overall testing procedures, and must insure proctors and test examiners receive training and abide by all testing procedures. New Jersey public schools face financial penalties or withdrawal of state funding and teacher tenure charges for not adhering to test security measures.

Reliability and Validity

New Jersey is required by federal law to ensure the reliability and validity of all instruments measuring student achievement (NJDOE, 2009). The NJDOE developed a model

assessment system in order to review and modify the system as deemed necessary to assure all data points are accurately reported and recorded. In order to ensure reliability and validity the state aligns the assessments with valid and reliable existing state content standards.

Guiding theory and scoring methods ensure reliability of the NJ HSPA scores. The design of the NJ HSPA relies on the assumptions of Classic Test Theory (CTT) which build on the notion of an error free or true measurement score (NJDOE, 2009).

“Any observed measurement, such as test score X , is defined as a composite of true score T and its associated error ($X=T + \text{Error}$) ...Estimating the size of the measurement error in associated with the true score is key to estimating the reliability.” (NJDOE, 2009)

The assessments are designed with valid and reliable controls that are built in, including highly trained readers for all open-ended items who use established rubrics, implement read-behinds and, in most cases, double scoring- two cycles of reporting, as well as a mechanism for rescoring of test when results are in question. For open-ended items that earn close, but not proficient scores, the items are automatically entered into a scoring process, in order to determine a final decision. Districts are afforded the chance to validate the accuracy of demographic data on all students through a record change process. Districts may request a similar consideration once they receive their Cycle I score reports. The state assures a 95% confidence interval calculated around the school or districts' proficiency for all subgroups and also has a “safe harbor” calculation applied to all students, as well as subgroup results. This includes a 75% confidence interval in the determination. An appeal process is in place to secure against an error in the data or calculation at any step in the process (US DOE, 2010).

At the March 2002 administration of the NJ HSPA, proficiency levels for the Language Arts Literacy and Mathematics sections were established. In order to pass the entire HSPA, a student must obtain a passing score of at or above 200 on each section out of a possible 300 points. Students' scores on the HSPA fall into one of three categories: Advanced Proficient--a score achieved by the student at or above the score of 250 that indicate a comprehensive and in-depth understanding of the knowledge and skills measured by a content-area component of any State assessment; Proficient--a score achieved by the student between 200 and 249 that indicates a solid understanding of content measured by an individual section of any State assessment; and Partially proficient--a score achieved by the student below the cutoff score of 199 that indicates a partial understanding of the content measured by an individual section of any State assessment (NJDOE, 2006). Students who have fulfilled all of the course requirements for graduation but fail to pass the HSPA, or its alternative will not receive a high school diploma (NJDOE, 2011). A student in this situation has the following options:

1. Continue an alternative process The Alternative High School Assessment, AHSA, (formerly SRA or Special Review Assessment) is an alternative assessment that provides students with the opportunity to exhibit their understanding and mastery of the HSPA skills in contexts that are familiar and related to their experiences. The AHSA content is linked to the HSPA test specifications in order to ensure that students who are certified through the AHSA process have demonstrated the skills and competencies at levels comparable to students who passed the HSPA test (NJDOE, 2010).
2. Return to the school at the time of testing the following year and take the HSPA for the third time.

3. Pass the General Educational Development (GED) test. The results displayed on NCLB Reports are based on the state assessment data with the NCLB conditions applied. Additionally, the NCLB data incorporate the data appeals submitted by districts/schools that have been granted by the NJDOE. Therefore, the data in the NCLB Reports are different from the data displayed on the NJ School Report Cards (NJDOE, 2010).

CHAPTER IV

ANALYSIS OF THE DATA

INTRODUCTION

The primary purpose of this cross-sectional, non-experimental, explanatory, quantitative research design study is to determine the influence of student, staff and school variables on student achievement in Language Arts and Mathematics HSPA 2011 scores. This study focused on reporting the analysis and descriptive statistical results of the factors that were entered into the predictive analytics software, IBM SPSS (Statistical Package for the Social Sciences), version 24. This study provides research on the strength and direction of the relationship between instructional minutes and academic achievement of Grade 11 students who achieved proficiency or above, based on the data collected from the 2011 New Jersey State Report Card and the 2011 New Jersey High School Proficiency Assessment for Language Arts and Mathematics.

Overarching Research Question

What is the influence of instructional minutes on Grade 11 proficiency percentages on the 2011 New Jersey High School Proficiency Assessment in Language Arts and Mathematics when controlling for student, staff and school variables?

Subsidiary Research Questions

Research Question 1: What is the influence of instructional minutes on Grade 11 student achievement in Language Arts Literacy as measured by the 2011 New Jersey High School Proficiency Assessment when controlling for student, staff and school variables?

Research Question 2: What is the influence of instructional minutes on Grade 11 student achievement in Mathematics as measured by the 2011 New Jersey High School Proficiency Assessment when controlling for student, staff and school variables?

Null Hypothesis

Null Hypothesis 1: No statistically significant relationship exists between instructional minutes and the Grade 11 Language Arts scores on the 2011 New Jersey High School Proficiency Assessment when controlling for student, staff and school variables.

Null Hypothesis 2: No statistically significant relationship exists between instructional minutes and the Grade 11 Mathematics scores on the 2011 New Jersey High School Proficiency Assessment when controlling for student, staff and school variables.

The research goal is to elaborate upon the strength and direction of the relationship between instructional minutes and student achievement upon NJ HSPA-11 Language Arts (LA) and Mathematics (MA) scores. This study adds to the current literature on the impact of instructional minutes in relation to student achievement.

Data

The data for this study was obtained from the New Jersey Department of Education website. The NJDOE reports that the data presented in the 2011 report card are data from the 2010-2011 school year (NJDOE, 2011). Being that 2011 was the most recent year for which the New Jersey Department of Education included all the variables needed for this study, the 2011 NJ School Report Card data (issued March 2012) was used for this study. The 2011 NJ School Report Card was required for information on the number of instructional hours and minutes each

school reported. The enrollment numbers were based on October 15, 2010 and except for the financial data, which is district level information, all the data reported are school-level data. This 2010-2011 data was downloaded in a Microsoft EXCEL format. The instructional time data was coded by hours and minutes for example, FINSTIMH is equivalent to the total instructional time for full time students in hours; FINSTIMM is equivalent to instructional time for full time students in minutes. The SPSS analysis required a conversion of the hours and minutes into total minutes, in order for SPSS analysis to be completed. Once the hours and minutes were converted to total minutes, an SPSS analysis to determine a correlation between instructional time and student achievement on the 2011 NJ HSPA Language Arts and Mathematics was able to be completed.

The determination of statistical significance was accomplished through first running a simultaneous multiple regression for each subject. Simultaneous multiple regressions were tested using the SPSS software after the data was siphoned, formatted in EXCEL spreadsheets, clarified and compiled. The statistically significant influence of instructional minutes on the 2011 Grade 11 NJ HSPA student achievement, while controlling for the student, faculty and school variables were the ultimate goal. Only public, non-charter, New Jersey high schools that participated in the 2011 New Jersey High School Proficiency Assessment in Language Arts and Mathematics and were associated with District Factor Groupings in the eight categories of A, B, CD, DE, FG, GH, I or J were included. Schools with missing information on the reporting forms for the New Jersey School Report Card were removed from the data set. Once cleaned and compiled a total of 258 public high schools were ultimately identified for this study. This initial data set did provide adequate power to run all analyses. Consequent to implementing Field's (2013) *R* for random data parameters, all of the computed "Expected *R*" values were close to zero. Once these sets of

significant predictor variables are determined for each subject, a hierarchical regression model will be used to determine the contributions that each of these significant variables have on the pass rate for the particular HSPA test. The hierarchical regression will also show the direction and strength of the relationship that each significant predictor variable has with the dependent variable.

Variables

The dependent or outcome variable measured within the confines of this study was the aggregate student achievement on the Grade 11 NJ HSPA 2011. To this end, the scores from both the language arts and mathematics sections were used. These sections were scored on a range of one to three-hundred, with two-hundred to two-hundred and fifty representing the passing proficient score, with each section being scored, and either passed or failed, separately. A score of two-hundred and fifty to three hundred represents an advanced proficient score, while a score of less than two-hundred represents the categorization of partially proficient, which in turn resulted in failure for the student (NJDOE, 2009). Within the confines of this study, a score of proficient or advanced proficient is to be the measurement value applied to the dependent variable.

The independent variable was instructional time, defined as the exact amount of time a school dedicates to instruction during a normal school day. Additional independent variables for this study are: (a) Student variables: student attendance, student mobility, percentage of students with limited English proficiency (LEP), percentage of students with disabilities, socioeconomic status (SES), and, (b) Staff variables: faculty attendance, faculty credentials, faculty mobility and, (c) School variables: school size, length of school day and instructional minutes.

Table 1*Independent Variables Used in the Study*

Variable	Label	Description
Student Attendance	Attendance	Student Attendance Rate
Student Mobility	STMOB	Student Mobility Rate
Limited English Proficiency	LEPCT	Percent of language/Percent of LEP/ELL students
Students with Disabilities	Disab	Percent of students with an IEP
Low socioeconomic students	SES	Percentage of students eligible for free or reduced lunch
Staff Attendance	FATTEND	Faculty attendance rate
Staff Credentials	Ma+	Percentage of faculty with master's degree or higher
Faculty Mobility	FMOBILITY	Percent of faculty who entered or left the school during the school year
School Size	SchoolSize	Total School Enrollment as of October 15, 2010
Length of School Day	SDL	Length of school day in minutes
Instructional Minutes	FINSTIMH FINSTIMM	Total instructional time

Research Question 1: Analysis and Results

Research Question 1: What is the influence of instructional time on the aggregate percentage of students achieving Proficient and Advanced Proficient in grade 11 on the standardized assessment in Language Arts Literacy measured by NJHSPA for 2010-2011 school year when controlling for student, faculty, and school variables?

Procedure

Once the sample of 258 schools, which had all the necessary data items as discussed in Chapter III was compiled, the data set was entered into IBM's SPSS statistical software system. Field (2013) provides a formula which given a particular sample size and number of predictor variables in a multiple regression allows one to estimate the minimum effect size R needed to achieve a .80 power level. (According to Cohen (1988), a power level of .80 is considered to be sufficient in most statistical analyses.) Per Field, the expected effect size R for a random set of regression data is $R = k / (N - 1)$, where k is the number of parameters and N is the sample size. Hence, for the data set used in this study, $R = 11 / (258 - 1) = .043$. This result means that if the effect size of the regression analysis is at least $R = .043$, the benchmark power level of .80 should be achieved. This effect size is sufficiently close to zero, so that the chances of realizing it are quite high.

Descriptive Statistics

Table 2

Descriptive Statistics

Variables	N	Mean	Median	Standard Deviation	Skewness
LAL TPAP	258	87.75	92.20	11.72	-2.09
LALtest (SES)	258	79.59	57.00	75.42	2.52
DISAB	258	15.66	15.10	4.93	.55
StuAttend	258	92.62	93.60	6.33	-11.00
LEP	258	3.32	1.20	6.50	4.62
STMOB	258	10.57	7.65	9.62	2.74
FacMobility	258	4.53	3.00	5.82	3.20
MA	258	49.22	47.95	13.39	.22
FacAttendance	258	96.00	96.30	1.90	-.86
SchoolSize	258	1197	1100	652	.84
LengthofSchoolDay	258	411.43	404	29.75	1.32
FulldayInstructionalTime	258	353.67	348.00	31.47	1.31

Table 2 shows descriptive statistics for the dependent variable LAL TPAP as well as the 11 predictor variables. The dependent variable has a mean of 87.75 meaning that on average the high schools included in the sample had 87.75% of the students achieving Proficient or Advanced Proficient on the LAL HSPA. The standard deviation of these passing percentages was 11.72%. The median percentage of students passing the HSPA in these schools was 92.20%.

For the 258 schools in the sample, the average percentage of low SES students was 79.59% while the average percentages of disabled students was 15.66% and LEP students was

3.32%. The mean student attendance rate was 92.62%, while the average student mobility rate was 10.57%. The mean percentage of low SES students may seem high, however this percentage is driven by the fact that 64% (i.e., 165 out of 258) of the schools in the sample are from the four lowest DFG groups.

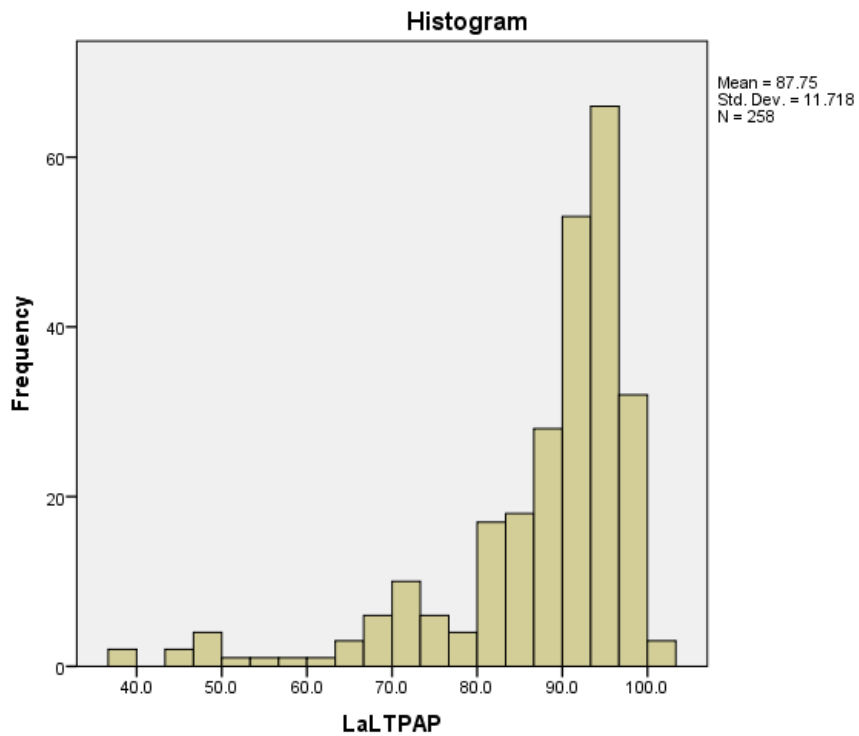
The average faculty mobility rate for the schools included in our sample was 4.53% while the percentage of faculty holding a Master's degree or higher was 49.22%. The mean faculty attendance rate was 96.00%.

The average school size for schools included in the sample was 1197.22. The mean school day length was 411.43 minutes of which 353.67 minutes was dedicated to instructional time.

Simultaneous Regression

A simultaneous regression model was run for HSPA Language Arts. The dependent variable for this model was the Language Arts HSPA pass rates defined to be the sum of the percentages of students earning Proficient and Advanced Proficient scores. The predictor variables used in this simultaneous model were SES, faculty mobility, percentage of students with disabilities, percentage of faculty with advanced degrees (MA or higher), daily instructional minutes, student attendance rate, faculty attendance rate, percentage of Limited English Proficiency students, school size, student mobility rate and the length of the school day.

Table 3



An examination of the histogram of the LAL HSPA pass rates for the schools examined, revealed a mean or 87.75.

Table 4

Descriptives

		Statistic	Std. Error
LaLTPAP	Mean	87.747	.7295
	95% Confidence Interval for Mean	Lower Bound 86.310	
		Upper Bound 89.183	
	5% Trimmed Mean	89.256	
	Median	92.200	
	Variance	137.308	
	Std. Deviation	11.7179	
	Minimum	37.9	
	Maximum	100.0	
	Range	62.1	
	Interquartile Range	10.9	
	Skewness	-2.090	.152
	Kurtosis	4.661	.302

Table 4 shows descriptive statistics for the HSPA Language Arts proficient and advanced proficient scores for the 258 high schools. The mean proficient and advanced proficient scores for LAL was 87.75% with a standard deviation of 11.72%.

Table 5

Tests of Normality

	Kolmogorov-Smirnov ^a			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
LaLTPAP	.195	258	.000	.763	258	.000

a. Lilliefors Significance Correction

As a further exercise, the Kolmogorov-Smirnov and Shapiro-Wilk tests for normality were run on the dependent variable. Since the sample of $n = 258$ was less than 2000, the researcher relied on the Shapiro-Wilk test results (Field, 2013). The Shapiro-Wilk test showed that the distribution of the dependent variable was significantly different from normal: $W(258) = .763$, p

< .001.

A least squares multiple linear regression was performed in order to obtain accurate estimates of the model parameters, such as the standardized betas. According to Gelman & Hill (2007) least squares regressions will always provide model parameter estimates which minimize error, eliminating the need to assume any normality assumptions. Field (2013) further states that in order for the estimates of the parameters in the regression model to be optimal, the set of residuals from the fitted regression model must be normally distributed. Moreover, Nau (2017) explicitly states that in a regression model the dependent and independent variables themselves do not need to be normally distributed.

Table 6

Model Summary ^b										
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	R Square Change	Change Statistics			Sig. F Change	Durbin-Watson
						F Change	df1	df2		
1	.897 ^a	.804	.796	5.2962	.804	92.005	11	246	.000	2.043

a. Predictors: (Constant), LaLEtest, FacMobility, DISAB, MA, FulldayInstructionalTime, StuAttend, FacAttendance, LEP, SchoolSize, STMOB, LengthofSchoolDay

b. Dependent Variable: LaLTPAP

As a whole, the model explained 79.6% of the variation in the Language Arts HSPA pass rates between schools as indicated by the adjusted R Square value of .796. Moreover, the model's Durbin-Watson statistic of 2.043 indicates that the model had no significant auto correlation between the regression residuals (Field, 2013). In addition, the fact that the effect size of this regression of $R = .897$ exceeds minimum threshold effect size of .043 needed to achieve the benchmark power level of .80 suggests that this regression analysis had adequate statistical power (Field, 2013).

Table 7

		ANOVA^a				
Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	28387.996	11	2580.727	92.005	.000 ^b
	Residual	6900.286	246	28.050		
	Total	35288.282	257			

a. Dependent Variable: LaLTPAP

b. Predictors: (Constant), LaLEtest, FacMobility, DISAB, MA, FulldayInstructionalTime, StuAttend, FacAttendance, LEP, SchoolSize, STMOB, LengthofSchoolDay

The ANOVA table shows that the Language Arts HSPA simultaneous regression model as a whole was statistically significant: $F(11,246) = 92.01, p < .001$.

Table 8

Coefficients^a

Model		Unstandardized		Standardized		95.0% Confidence		Correlations		Collinearity Statistics		VIF	
		Coefficients		Coefficients		Interval for B		Zero-order	Partial	Part	Tolerance		
		B	Std. Error	Beta	t	Lower Bound	Upper Bound						
					Sig.								
1	(Constant)	18.168	19.487		.932	.352							
	SchoolSize	.002	.001	.100	2.722	.007	.001	.003	.158	.171	.077	.588	1.701
	StuAttend	.128	.053	.073	2.406	.017	.023	.233	.327	.152	.068	.874	1.144
	DISAB	-.585	.076	-.246	-	.000	-.734	-.436	-.482	-.442	-.218	.785	1.275
					7.733								
	LengthofSchoolDay	-.027	.019	-.068	-	.165	-.065	.011	-.036	-.089	-.039	.333	3.001
					1.394								
	LEP	-.698	.060	-.387	-	.000	-.817	-.580	-.658	-.596	-.328	.719	1.391
					11.64								
					3								
	FulldayInstructional Time	.012	.018	.033	.667	.506	-.024	.048	-.096	.042	.019	.327	3.060
	STMOB	-.407	.046	-.334	-	.000	-.497	-.317	-.729	-.494	-.252	.566	1.766
					8.921								
	FacAttendance	.832	.196	.135	4.245	.000	.446	1.218	.480	.261	.120	.785	1.273
	MA	.013	.027	.015	.488	.626	-.040	.066	.199	.031	.014	.851	1.174
	FacMobility	-.178	.059	-.089	-	.003	-.295	-.062	-.271	-.188	-.085	.915	1.093
					3.007								
	LaLEtest	-.022	.006	-.144	-	.000	-.034	-.011	-.395	-.231	-.105	.534	1.872
					3.727								

a. Dependent Variable: LaLTPAP

An examination of the standardized beta coefficients indicates that some, but not all, variables in the model were significant predictors of HSPA LAL performance. They were School Size, Student Attendance, Student Disability, LEP, Student Mobility, Faculty Attendance, Faculty

Mobility and SES.

LEP was a significant predictor in the model ($\beta = -.387$; $t = -11.643$; $p < .001$), contributing 14.9% (i.e., $(-.387)^2 = .149$) of the variance in NJ HSPA LAL performance. Schools with a lower percentage of students classified as LEP perform better than schools with a higher percentage of these students.

Student mobility was also a significant predictor in the model ($\beta = -.334$; $t = -8.921$; $p < .001$), contributing 11.2% (i.e., $(-.334)^2 = .112$) of the variance in NJ HSPA LAL performance.

Schools with lower student mobility rates performed better than schools with a higher student mobility rates.

Moreover, the percentage of disabled students (i.e., students receiving special education services) in a school was a significant predictor in the model ($\beta = -.246$; $t = -7.733$; $p < .001$), contributing 6.1% (i.e., $(-.246)^2 = .061$) of the variance in NJ HSPA LAL performance. Schools with lower percentages of students with disabilities performed better than schools with a higher disabled student percentages.

SES was also a significant predictor in the model ($\beta = -.144$; $t = -3.727$; $p < .001$), contributing 2.1% (i.e., $(-.144)^2 = .021$) of the variance in NJ HSPA LAL performance. Schools in regions of higher socioeconomic status performed better than schools in regions of lower socioeconomic status.

A school's faculty attendance rate was a significant predictor in the model ($\beta = .135$; $t = 4.245$; $p < .001$), contributing 1.8% (i.e., $(.135)^2 = .018$) of the variance in NJ HSPA LAL performance. Schools with higher faculty attendance rates performed better than schools with lower faculty attendance rates.

School size was a significant predictor in the model ($\beta = .100$; $t = 2.722$; $p = .007$), contributing

1.0% (i.e., $(.100)^2 = .010$) of the variance in NJ HSPA LAL performance. Larger schools performed better than smaller sized schools.

A school's faculty mobility rate was a significant predictor in the model ($\beta = -.089$; $t = -3.007$; $p = .003$), contributing .8% (i.e., $(.089)^2 = .008$) of the variance in NJ HSPA LAL performance. Schools with lower faculty mobility rates performed better than schools with higher faculty mobility rates.

A school's student attendance rate was a significant predictor in the model ($\beta = .073$; $t = 2.406$; $p = .017$), contributing .5% (i.e., $(.073)^2 = .005$) of the variance in NJ HSPA LAL performance. Schools with higher student attendance rates performed better than schools with lower student attendance rates.

The Variance Inflation Factor (VIF) measures the degree of collinearity that a particular predictor variable has with the other predictors in the regression model. A VIF greater than 2.00 suggests that the predictor variable has a high degree of collinearity with the other independent variables in the model and hence is a cause of concern. (Field, 2013) In this particular regression model, length of school day and instructional minutes both had VIF's exceeding this threshold (3.001 and 3.060, respectively). The fact that these two predictors were highly correlated with each other ($r = .807$, $p < .001$) was the primary reason for these high VIF's. Because of this, the researcher chose to eliminate one of these predictor variables in subsequent regression analyses. She chose to eliminate the length of the school day from the subsequent regression model since her variable of interest for the study was instructional minutes.

Hierarchical Regression

The researcher's next step was to perform a hierarchical regression for Language Arts HSPA. With the exception of instructional minutes, the researcher only included in the hierarchical

regression analysis, those predictor variables which were statistically significant in the simultaneous regression. These variables were school size, student attendance, student disability, LEP, student mobility, faculty attendance, faculty mobility and SES. In addition, instructional minutes was used as a predictor variable in the hierarchical model, since it is the variable of interest in the researcher's study.

The researcher performed the hierarchical regression analysis, using the Enter method in SPSS. She first added the significant predictor variables which were student based (these included SES, student attendance, student mobility, LEP and students with disabilities), followed by the significant predictor variables which were faculty based (i.e., faculty attendance and faculty mobility), then the significant predictor variables which were school based (which was only school size). It was only in the fourth model that instructional minutes, the variable of interest, was included as a predictor variable.

Table 9

Model Summary ^e										
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	R Square Change	Change Statistics			Sig. F Change	Durbin-Watson
						F Change	df1	df2		
1	.874 ^a	.765	.760	5.7412	.765	163.722	5	252	.000	
2	.892 ^b	.795	.790	5.3760	.031	18.697	2	250	.000	
3	.896 ^c	.802	.796	5.2913	.007	9.075	1	249	.003	
4	.896 ^d	.803	.796	5.2971	.000	.454	1	248	.501	2.015

a. Predictors: (Constant), DISAB, LaLEtest, StuAttend, LEP, STMOB

b. Predictors: (Constant), DISAB, LaLEtest, StuAttend, LEP, STMOB, FacMobility, FacAttendance

c. Predictors: (Constant), DISAB, LaLEtest, StuAttend, LEP, STMOB, FacMobility, FacAttendance, SchoolSize

d. Predictors: (Constant), DISAB, LaLEtest, StuAttend, LEP, STMOB, FacMobility, FacAttendance, SchoolSize, FulldayInstructionalTime

e. Dependent Variable: LaLTPAP

The Durbin-Watson statistic was 2.015 indicating that the regression residuals did not have significant auto correlation (Field, 2013). The F Change statistic was 163.722 in Model 1, was 18.697 in Model 2, 9.075 in Model 3 and .454 in Model 4. The Significant F Change value was

$p < .001$ for Model 1, $p < .001$ for Model 2, $p = .003$ for Model 3, and $p = .501$ for Model 4. This means that the student based variables as a group, as well as both the faculty based variables as a group and school size each had a significant contribution to the model. However, when instructional minutes was included in the model, it was not a significant predictor of the dependent variable.

The adjusted R Square change for Model 1 was .760 which means that 76.0% of the variance in the dependent variable can be explained by differences in the various student based variables between schools. The adjusted R Square change for Model 2 was .030 (i.e., .790-.760) which means that an additional 3.0% of the variation in the LAL HSPA pass rates was due to the two faculty based variables. The adjusted R Square change for Model 3 was .006 (i.e., .796 - .790) which indicates that .6% of the variation in the dependent variable was due to school size.

Lastly, Model 4's Adjusted R Square change of .000 (i.e., .796-.796) suggests that none of the variation in the LAL HSPA pass rates can be explained by the differences in daily instructional minutes between schools. From this information the researcher concluded that Model 1 (i.e., the model in which only the student based predictors were added) was the strongest model, since it had the largest Adjusted R Square change. Model 3 was considered to be the best predictive model due to the fact that it was statistically significant and its Adjusted R Square of .796 was the highest among the four component models of the hierarchical regression.

Table 10

ANOVA^a

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	26982.127	5	5396.425	163.722	.000 ^b
	Residual	8306.155	252	32.961		
	Total	35288.282	257			
2	Regression	28062.862	7	4008.980	138.711	.000 ^c
	Residual	7225.419	250	28.902		
	Total	35288.282	257			
3	Regression	28316.946	8	3539.618	126.427	.000 ^d
	Residual	6971.336	249	27.997		
	Total	35288.282	257			
4	Regression	28329.691	9	3147.743	112.184	.000 ^e
	Residual	6958.591	248	28.059		
	Total	35288.282	257			

a. Dependent Variable: LaLTPAP

b. Predictors: (Constant), DISAB, LaLEtest, StuAttend, LEP, STMOB

c. Predictors: (Constant), DISAB, LaLEtest, StuAttend, LEP, STMOB, FacMobility, FacAttendance

d. Predictors: (Constant), DISAB, LaLEtest, StuAttend, LEP, STMOB, FacMobility, FacAttendance, SchoolSize

e. Predictors: (Constant), DISAB, LaLEtest, StuAttend, LEP, STMOB, FacMobility, FacAttendance, SchoolSize, FulldayInstructionalTime

On an overall basis, Model 1 which includes the student based variables as predictors was

statistically significant: $F(5,252) = 163.722, p < .001$. The other models of the hierarchical regression in which the faculty based variables, the school based variable, and instructional minutes were added in succession were also statistically significant as a whole: for Model 2 $F(7,250) = 138.711, p < .001$; for Model 3 $F(8,249) = 126.427, p < .001$; and for Model 4 $F(9,248) = 112.184, p < .001$.

Table 11

Coefficients ^a						
Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	86.367	5.521		15.644	.000
	LaLEtest	-.015	.005	-.100	-2.990	.003
	StuAttend	.207	.056	.117	3.707	.000
	STMOB	-.514	.045	-.422	-11.531	.000
	LEP	-.730	.063	-.405	-11.534	.000
	DISAB	-.557	.080	-.234	-6.994	.000
2	(Constant)	4.292	18.954		.226	.821
	LaLEtest	-.014	.005	-.090	-2.878	.004
	StuAttend	.128	.054	.073	2.381	.018
	STMOB	-.449	.043	-.369	-10.379	.000
	LEP	-.696	.060	-.386	-11.697	.000
	DISAB	-.559	.075	-.235	-7.488	.000
	FacAttendance	.931	.196	.151	4.741	.000
FacMobility	-.204	.060	-.101	-3.421	.001	
3	(Constant)	10.690	18.775		.569	.570
	LaLEtest	-.024	.006	-.154	-4.117	.000
	StuAttend	.129	.053	.073	2.438	.015
	STMOB	-.407	.045	-.334	-9.097	.000
	LEP	-.687	.059	-.381	-11.716	.000
	DISAB	-.570	.074	-.240	-7.747	.000
	FacAttendance	.843	.196	.137	4.310	.000
	FacMobility	-.188	.059	-.093	-3.178	.002
	SchoolSize	.002	.001	.107	3.013	.003
4	(Constant)	13.230	19.170		.690	.491
	LaLEtest	-.023	.006	-.150	-3.969	.000
	StuAttend	.131	.053	.074	2.469	.014
	STMOB	-.405	.045	-.332	-9.007	.000
	LEP	-.686	.059	-.380	-11.682	.000
	DISAB	-.581	.075	-.244	-7.696	.000
	FacAttendance	.844	.196	.137	4.312	.000
	FacMobility	-.185	.059	-.092	-3.124	.002
	SchoolSize	.002	.001	.103	2.836	.005
	FullDayInstructionalTime	-.008	.011	-.020	-.674	.501

a. Dependent Variable: LaLTPAP

An examination of the standardized beta coefficients in Model 3 (which is the best predictor model of this hierarchical regression) indicates that some, but not all, variables in the model were significant predictors of HSPA LAL performance. The significant variables were SES, student

attendance, student mobility, LEP, students with disabilities, faculty attendance, faculty mobility, and school size.

LEP was a significant predictor in the model ($\beta = -.381$; $t = -11.716$; $p < .001$), contributing 14.5% (i.e., $(-.381)^2 = .145$) of the variance in NJ HSPA LAL performance. Schools with a lower percentage of students classified as LEP perform better than schools with a higher percentage of these students.

Student mobility was also a significant predictor in the model ($\beta = -.334$; $t = -9.097$; $p < .001$), contributing 11.2% (i.e., $(-.334)^2 = .112$) of the variance in NJ HSPA LAL performance.

Schools with lower student mobility rates performed better than schools with higher student mobility rates.

Moreover, the percentage of disabled students (i.e., students receiving special education services) in a school was a significant predictor in the model ($\beta = -.240$; $t = -7.747$; $p < .001$), contributing 5.8% (i.e., $(-.240)^2 = .058$) of the variance in NJ HSPA LAL performance. Schools with lower percentages of students with disabilities performed better than schools with higher disabled student percentages.

SES was also a significant predictor in the model ($\beta = -.154$; $t = -4.117$; $p < .001$), contributing 2.4% (i.e., $(-.154)^2 = .024$) of the variance in NJ HSPA LAL performance. Schools in regions of higher socioeconomic status performed better than schools in regions of lower socioeconomic status.

A school's faculty attendance rate was a significant predictor in the model ($\beta = .137$; $t = 4.310$; $p < .001$), contributing 1.9% (i.e., $(.137)^2 = .019$) of the variance in NJ HSPA LAL performance. Schools with higher faculty attendance rates performed better than schools with lower faculty attendance rates.

School size was a significant predictor in the model ($\beta=.107$; $t=3.013$; $p<.001$), contributing 1.1% (i.e., $(.107)^2 = .011$) of the variance in NJ HSPA LAL performance. Larger schools performed better than smaller sized schools.

A school's faculty mobility rate was a significant predictor in the model ($\beta=-.093$; $t=-3.178$; $p=.002$), contributing .9% (i.e., $(-.093)^2 = .009$) of the variance in NJ HSPA LAL performance. Schools with lower faculty mobility rates performed better than schools with higher faculty mobility rates.

A school's student attendance rate was the last significant predictor in the model ($\beta=.073$; $t=2.438$; $p=.015$), contributing .5% (i.e., $(.073)^2 = .005$) of the variance in NJ HSPA LAL performance. Schools with higher student attendance rates performed better than schools with lower student attendance rates.

Model 3 of this hierarchical regression appears to have no significant multicollinearity issues, since the VIF's for all the predictor variables in the model were less than 2.000. (CITE) The VIF's of the predictor variables in the other three models of this hierarchical regression were also all less than 2.000, suggesting that these models as well had no meaningful multicollinearity issues.

In the LAL HSPA hierarchical regression model, the significant predictor variables included the student-based variables LEP, student mobility, students with disabilities, SES, and student attendance, along with the faculty-based variables faculty attendance and faculty mobility as well as the school-based variable school size. Instructional minutes was not a significant predictor in the hierarchical regressions. In the regressions, the variables which correlated positively with the dependent variable (as indicated by their standardized betas) were faculty attendance, school size, and student attendance. The other significant predictors – i.e.,

LEP, student mobility, students with disabilities, SES, and faculty mobility – all had negative correlations with the LAL HSPA pass rate. In the hierarchical regression model, LEP had the strongest relationship with the dependent variable, followed by student mobility, students with disabilities, SES, faculty attendance, school size, faculty mobility, and student attendance, respectively.

Null Hypothesis 1:

No statistically significant relationship exists between total minutes of daily school instructional time and the Grade 11 Language Arts scores on the 2011 New Jersey High School Proficiency Assessment when controlling for student, faculty, and school variables. The researcher retains the null hypothesis based on the data analysis and findings previously discussed. In both the simultaneous regression and hierarchical regression, total minutes of instructional time was not a statistically significant predictor variable of the variance in 11th grade Language Arts performance on the 2011 NJ HSPA between high schools.

Research Question 2: Analysis and Results

Research Question 1: What is the influence of instructional time on the aggregate percentage of students achieving Proficient and Advanced Proficient in grade 11 on the standardized assessment in Mathematics measured by NJHSPA for 2010-2011 school year when controlling for student, faculty, and school variables?

Table 12

Variables	N	Mean	Median	Standard Deviation	Skewness
Math TPAP	258	84.79	89.50	13.63	-2.01
MathEtest (SES)	258	79.70	57.00	75.40	2.51
DISAB	258	15.66	15.10	4.93	.55
StuAttend	258	92.62	93.60	6.33	-11.00
LEP	258	3.32	1.20	6.50	4.62
STMOB	258	10.57	7.65	9.62	2.74
FacMobility	258	4.53	3.00	5.82	3.20
MA	258	49.22	47.95	13.39	.22
FacAttendance	258	96.00	96.30	1.90	-.86
SchoolSize	258	1197	1100	652	.84
LengthofSchoolDay	258	411.43	404	29.75	1.32
FulldayInstructionalTime	258	353.67	348.00	31.47	1.31

Table 12 shows descriptive statistics for the dependent variable Math TPAP as well as the 11 predictor variables. The dependent variable has a mean of 84.79 meaning that on average the high schools included in the sample had 84.79% of the students achieving Proficient or Advanced Proficient on the Mathematics HSPA. The standard deviation of these passing

percentages was 13.63%. The median percentage of students passing the HSPA in these schools was 89.50%. The distribution of the passing percentages for the 258 schools had a left skew as indicated by the negative skewness statistic.

For the 258 schools in the sample, the average percentage of low SES students was 79.59% while the average percentages of disabled students was 15.66% and LEP students was 3.32%. The mean student attendance rate was 92.62%, while the average student mobility rate was 10.57%. The mean percentage of low SES students may seem high, however this percentage is driven by the fact that 64% (i.e., 165 out of 258) of the schools in the sample are from the four lowest DFG groups. The distribution of the student attendance variable was negatively skewed whereas the four other student based variables included in the study had positive skews.

The average faculty mobility rate for the schools included in our sample was 4.53% while the percentage of faculty holding a Master's degree or higher was 49.22%. The mean faculty attendance rate was 96.00%. Both the faculty mobility and percentage of faculty with advanced degrees variables had a positive skew, while faculty attendance was negatively skewed.

The average school size for schools included in the sample was 1197.22. The mean school day length was 411.43 minutes of which 353.67 minutes was dedicated to instructional time. All three of these school based variable exhibited positive skews.

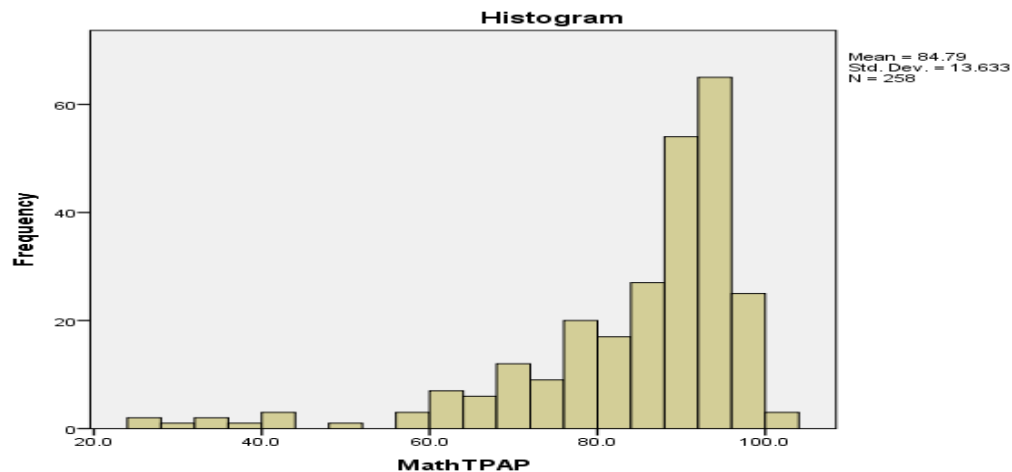
Simultaneous Regression

A simultaneous regression model was run for HSPA Mathematics. The dependent variable for this model was the Mathematics HSPA pass rates defined to be the sum of the percentages of students earning Proficient and Advanced Proficient scores. The predictor variables used in this simultaneous model were SES, faculty mobility, percentage of students with disabilities,

percentage of faculty with advanced degrees (MA or higher), daily instructional minutes, student attendance rate, faculty attendance rate, percentage of Limited English Proficiency students, school size, student mobility rate, and the length of the school day.

Prior to running the regression model, the researcher examined the distribution of the dependent variable to assess the degree of skewness in this distribution. The researcher used all 258 New Jersey high schools that met the inclusion criteria discussed previously.

Table 13



An examination of the histogram of the Mathematics HSPA pass rates for the schools examined, revealed that the distribution has a noticeable left skew.

Table 14

Descriptives

		Statistic	Std. Error	
MathTPAP	Mean	84.790	.8487	
	95% Confidence Interval for Mean	Lower Bound	83.118	
		Upper Bound	86.461	
	5% Trimmed Mean	86.439		
	Median	89.500		
	Variance	185.847		
	Std. Deviation	13.6326		
	Minimum	26.7		
	Maximum	100.0		
	Range	73.3		
	Interquartile Range	14.2		
	Skewness	-2.008	.152	
	Kurtosis	4.622	.302	

Table 14 shows descriptive statistics for the HSPA Mathematics proficient and advanced proficient scores for the 258 high schools. The mean proficient and advanced proficient scores for Mathematics was 84.79% with a standard deviation of 13.63%. In order to get a more analytical measure of the degree of skewness in the dependent variable, the researcher calculated a skewness z score by dividing the skewness statistic by the skewness standard error. Since the result of this calculation was $-2.008 / .152 = -13.21$ was outside the -1.96 to 1.96 range, she concluded that the dependent variable displayed a significant degree of skewness (Field, 2013).

Table 15

Tests of Normality						
	Kolmogorov-Smirnov ^a			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
MathTPAP	.180	258	.000	.790	258	.000

a. Lilliefors Significance Correction

As a further exercise, the Kolmogorov-Smirnov and Shapiro-Wilk tests for normality were run on the dependent variable. Since the sample of $n = 258$ was less than 2000, the researcher relied on the Shapiro-Wilk test results (Field, 2013). The Shapiro-Wilk test showed that the distribution of the dependent variable was significantly different from normal: $W(258) = .790$, $p < .001$. This result was not surprising due to the significant skewness of this variable. Despite the significant skewness and non-normality of the dependent variable, one can still perform a least squares multiple linear regression in order to obtain accurate estimates of the model parameter, such as the standardized beta. According to Gelman & Hill (2007) least squares regressions will always provide model parameter estimates which minimize error, eliminating the need to assume any normality assumptions. Field (2013) further states that in order for the estimates of the parameter in the regression model to be optimal, the set of residuals from the fitted regression model must be normally distributed. Moreover, Nau (2017) explicitly states that in a regression model the dependent and independent variables themselves do not need to be normally distributed.

Table 16

Model Summary^b

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	.879 ^a	.773	.763	6.6427	2.037

a. Predictors: (Constant), MathEtest, FacMobility, DISAB, MA, FulldayInstructionalTime, StuAttend, FacAttendance, LEP, SchoolSize, STMOB, LengthofSchoolDay

b. Dependent Variable: MathTPAP

As a whole, the model explained 76.3% of the variation in the Mathematics HSPA pass rates between schools as indicated by the adjusted R Square value of .763. Moreover, the model's Durbin-Watson statistic of 2.043 indicates that the model had no significant auto correlation between the regression residuals (Field, 2013). In addition, the fact that the effect size of this regression of $R = .879$ exceeds minimum threshold effect size of .043 needed to achieve the benchmark power level of .80 suggests that this regression analysis had adequate statistical power (Field, 2013).

Table 17

ANOVA^a

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	36908.018	11	3355.274	76.040	.000 ^b
	Residual	10854.783	246	44.125		
	Total	47762.802	257			

a. Dependent Variable: MathTPAP

b. Predictors: (Constant), MathEtest, FacMobility, DISAB, MA, FulldayInstructionalTime, StuAttend, FacAttendance, LEP, SchoolSize, STMOB, LengthofSchoolDay

The ANOVA table shows that the Mathematics HSPA simultaneous regression model as a whole was statistically significant: $F(11,246) = 76.04$, $p < .001$.

Table 18

		Coefficients ^a											
Model		Unstandardized Coefficients		Standardized	t	Sig.	95.0% Confidence Interval for B		Correlations			Collinearity Statistics	
		B	Std. Error	Beta			Lower Bound	Upper Bound	Zero-order	Partial	Part	Tolerance	VIF
1	(Constant)	-17.637	24.442		-.722	.471	-65.779	30.505					
	SchoolSize	.003	.001	.141	3.564	.000	.001	.005	.179	.222	.108	.587	1.704
	StuAttend	.161	.067	.079	2.415	.016	.030	.293	.333	.152	.073	.874	1.144
	DISAB	-.689	.095	-.249	-7.259	.000	-.876	-.502	-.482	-.420	-.221	.785	1.275
	LengthofSchoolDay	-.020	.024	-.043	-.819	.414	-.067	.028	-.008	-.052	-.025	.333	3.001
	LEP	-.758	.075	-.361	-10.081	.000	-.906	-.610	-.631	-.541	-.306	.719	1.390
	FulldayInstructionalTime	.020	.023	.045	.853	.394	-.026	.065	-.067	.054	.026	.327	3.060
	STMOB	-.415	.057	-.293	-7.254	.000	-.528	-.302	-.701	-.420	-.220	.566	1.766
	FacAttendance	1.102	.246	.154	4.482	.000	.618	1.586	.490	.275	.136	.785	1.274
	MA	.008	.034	.008	.245	.807	-.058	.074	.200	.016	.007	.852	1.174
	FacMobility	-.242	.074	-.103	-3.251	.001	-.389	-.095	-.282	-.203	-.099	.915	1.093
	MathEtest	-.031	.008	-.169	-4.060	.000	-.045	-.016	-.381	-.251	-.123	.534	1.873

a. Dependent Variable: MathTPAP

An examination of the standardized beta coefficients indicates that some, but not all, variables in the model were significant predictors of HSPA Mathematics performance. They

were School Size, Student Attendance, Student Disability, LEP, Student Mobility, Faculty Attendance, Faculty Mobility, and SES.

LEP was a significant predictor in the model ($\beta = -.361$; $t = -10.081$; $p < .001$), contributing 13.0% (i.e., $(-.361)^2 = .130$) of the variance in NJ HSPA Mathematics performance. Schools with a lower percentage of students classified as LEP perform better than schools with a higher percentage of these students.

Student mobility was also a significant predictor in the model ($\beta = -.293$; $t = -7.254$; $p < .001$), contributing 8.6% (i.e., $(-.293)^2 = .086$) of the variance in NJ HSPA Mathematics performance. Schools with lower student mobility rates performed better than schools with higher student mobility rates.

Moreover, the percentage of disabled students (i.e., students receiving special education services) in a school was a significant predictor in the model ($\beta = -.249$; $t = -7.259$; $p < .001$), contributing 6.2% (i.e., $(-.249)^2 = .062$) of the variance in NJ HSPA Mathematics performance. Schools with lower percentages of students with disabilities performed better than schools with higher disabled student percentages.

SES was also a significant predictor in the model ($\beta = -.169$; $t = -4.060$; $p < .001$), contributing 2.9% (i.e., $(-.169)^2 = .029$) of the variance in NJ HSPA Mathematics performance. Schools in regions of higher socioeconomic status performed better than schools in regions of lower socioeconomic status.

A school's faculty attendance rate was a significant predictor in the model ($\beta = .154$; $t = 4.482$; $p < .001$), contributing 2.4% (i.e., $(.154)^2 = .024$) of the variance in NJ HSPA

Mathematics performance. Schools with higher faculty attendance rates performed better than schools with lower faculty attendance rates.

School size was a significant predictor in the model ($\beta=.141$; $t=3.564$; $p<.001$), contributing 2.0% (i.e., $(.141)^2 = .020$) of the variance in NJ HSPA Mathematics performance. Larger schools performed better than smaller sized schools.

A school's faculty mobility rate was a significant predictor in the model ($\beta=-.103$; $t=-3.251$; $p=.001$), contributing 1.1% (i.e., $(-.103)^2 = .011$) of the variance in NJ HSPA Mathematics performance. Schools with lower faculty mobility rates performed better than schools with higher faculty mobility rates.

A school's student attendance rate was a significant predictor in the model ($\beta=.079$; $t=2.415$; $p=.016$), contributing .6% (i.e., $(.079)^2 = .006$) of the variance in NJ HSPA Mathematics performance. Schools with higher student attendance rates performed better than schools with lower student attendance rates.

The Variance Inflation Factor (VIF) measures the degree of collinearity that a particular predictor variable has with the other predictors in the regression model. A VIF greater than 2.00 suggests that the predictor variable has a high degree of collinearity with the other independent variables in the model and hence is a cause of concern. (CITE) In this particular regression model, length of school day and instructional minutes both had VIF's exceeding this threshold (3.001 and 3.060, respectively). The fact that these two predictors were highly correlated with each other ($r=.807$, $p<.001$) was the primary reason for these high VIF's. Because of this, the researcher chose to eliminate one of these predictor variables in subsequent regression analysis.

She chose to eliminate the length of the school day from the subsequent regression model since her variable of interest for the study was instructional minutes.

Hierarchical Regression

The researcher's next step was to perform a hierarchical regression for Mathematics HSPA. With the exception of instructional minutes, the researcher only included in the hierarchical regression analysis, those predictor variables which were statistically significant in the simultaneous regression. These variables were school size, student attendance, student disability, LEP, student mobility, faculty attendance, faculty mobility, and SES. In addition, instructional minutes was used as a predictor variable in the hierarchical model, since it is the variable of interest in the researcher's study.

The researcher performed the hierarchical regression analysis, using the Enter method in SPSS. She first added the significant predictor variables which were student based (these included SES, student attendance, student mobility, LEP and students with disabilities), followed by the significant predictor variables which were faculty based (i.e., faculty attendance and faculty mobility), then the significant predictor variables which were school based (which was only school size). It was only in the fourth model that instructional minutes, the variable of interest, was included as a predictor variable.

Hierarchical Regression

Table 19

Model Summary^e

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	R Square Change	Change Statistics			Sig. F Change	Durbin-Watson
						F Change	df1	df2		
1	.848 ^a	.719	.714	7.2919	.719	129.254	5	252	.000	
2	.872 ^b	.760	.753	6.7761	.040	20.912	2	250	.000	
3	.879 ^c	.772	.765	6.6137	.012	13.432	1	249	.000	
4	.879 ^d	.772	.764	6.6253	.000	.131	1	248	.718	2.026

a. Predictors: (Constant), STMOB, StuAttend, MathEtest, DISAB, LEP

b. Predictors: (Constant), STMOB, StuAttend, MathEtest, DISAB, LEP, FacMobility, FacAttendance

c. Predictors: (Constant), STMOB, StuAttend, MathEtest, DISAB, LEP, FacMobility, FacAttendance, SchoolSize

d. Predictors: (Constant), STMOB, StuAttend, MathEtest, DISAB, LEP, FacMobility, FacAttendance, SchoolSize, FulldayInstructionalTime

e. Dependent Variable: MathTPAP

The Durbin-Watson statistic was 2.026 indicating that the regression residuals did not have significant auto correlation. (CITE) The F Change statistic was 129.254 in Model 1, was 20.912 in Model 2, 13.432 in Model 3, and .131 in Model 4. The Significant F Change value was $p < .001$ for Model 1, $p < .001$ for Model 2, $p < .001$ for Model 3, and $p = .718$ for Model 4. This means that the instructional minutes by itself was not a significant predictor of the dependent variable. However, the student-based variables as a group, as well as both the faculty-based variables as a group and school size each had a significant contribution to the model.

The adjusted R Square change for Model 1 was .714 which means that 71.4% of the variance in the dependent variable can be explained by differences in the school-based variables between schools. The adjusted R Square change for Model 2 was .039 (i.e., .753-.714) which means that an additional 3.9% of the variation in the Mathematics HSPA pass rates was due to differences in the two faculty-based variables between the schools. The adjusted R Square change for Model 3 was .012 (i.e., .765 - .753) which indicates that 1.2% of the variation in the dependent variable was due to differences in school enrollments. Lastly, Model 4's Adjusted R Square change of -.001 (i.e., .764-.765) suggests that instructional minutes do not help explain any of the variation in the Mathematics HSPA pass rates between schools. From this information the researcher concluded that Model 2 (i.e., the model in which the student-based predictors were added) was the strongest model, since it had the largest Adjusted R Square change. Model 3 was considered to be the best predictive model due to the fact that its Adjusted R Square of .765 was the highest among the four component models of the hierarchical regression.

Table 20

ANOVA^a

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	34363.477	5	6872.695	129.254	.000 ^b
	Residual	13399.325	252	53.172		
	Total	47762.802	257			
2	Regression	36283.820	7	5183.403	112.889	.000 ^c
	Residual	11478.982	250	45.916		
	Total	47762.802	257			
3	Regression	36871.336	8	4608.917	105.369	.000 ^d
	Residual	10891.466	249	43.741		
	Total	47762.802	257			
4	Regression	36877.075	9	4097.453	93.349	.000 ^e
	Residual	10885.727	248	43.894		
	Total	47762.802	257			

a. Dependent Variable: MathTPAP

b. Predictors: (Constant), STMOB, StuAttend, MathEtest, DISAB, LEP

c. Predictors: (Constant), STMOB, StuAttend, MathEtest, DISAB, LEP, FacMobility, FacAttendance

d. Predictors: (Constant), STMOB, StuAttend, MathEtest, DISAB, LEP, FacMobility, FacAttendance, SchoolSize

e. Predictors: (Constant), STMOB, StuAttend, MathEtest, DISAB, LEP, FacMobility, FacAttendance, SchoolSize, FulldayInstructionalTime

On an overall basis, Model 1 which includes the student-based variables as predictors was statistically significant: $F(5,252) = 129.254, p < .001$. The other models of the hierarchical regression in which the faculty-based variables, the school-based variable school size, and instructional minutes were added in succession were all statistically significant as a whole: for Model 2 $F(7,250) = 112.889, p < .001$; for Model 3 $F(8,249) = 105.369, p < .001$; and for Model 4 $F(9,248) = 93.349, p < .001$.

Table 21

Coefficients ^a						
Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	80.521	7.012		11.483	.000
	MathEtest	-.018	.007	-.098	-2.697	.007
	StuAttend	.269	.071	.131	3.782	.000
	DISAB	-.675	.101	-.244	-6.672	.000
	LEP	-.807	.080	-.385	-10.049	.000
2	STMOB	-.562	.057	-.397	-9.923	.000
	(Constant)	-29.323	23.890		-1.227	.221
	MathEtest	-.016	.006	-.087	-2.564	.011
	StuAttend	.164	.068	.080	2.405	.017
	DISAB	-.677	.094	-.245	-7.201	.000
	LEP	-.763	.075	-.363	-10.169	.000
	STMOB	-.475	.055	-.335	-8.711	.000
	FacAttendance	1.246	.248	.174	5.031	.000
3	FacMobility	-.270	.075	-.115	-3.595	.000
	(Constant)	-19.566	23.469		-.834	.405
	MathEtest	-.031	.007	-.170	-4.243	.000
	StuAttend	.165	.066	.080	2.486	.014
	DISAB	-.693	.092	-.251	-7.542	.000
	LEP	-.749	.073	-.357	-10.220	.000
	STMOB	-.412	.056	-.290	-7.356	.000
	FacAttendance	1.111	.244	.155	4.545	.000
4	FacMobility	-.245	.074	-.105	-3.321	.001
	SchoolSize	.003	.001	.140	3.665	.000
	(Constant)	-21.270	23.977		-.887	.376
	MathEtest	-.031	.007	-.173	-4.243	.000
	StuAttend	.164	.067	.080	2.458	.015
	DISAB	-.686	.094	-.248	-7.262	.000
	LEP	-.750	.073	-.357	-10.208	.000
	STMOB	-.413	.056	-.292	-7.349	.000
	FacAttendance	1.110	.245	.155	4.534	.000
	FacMobility	-.247	.074	-.105	-3.332	.001
	SchoolSize	.003	.001	.143	3.663	.000
	FullDayInstructionalTime	.005	.014	.012	.362	.718

a. Dependent Variable: MathTPAP

An examination of the standardized beta coefficients in Model 3 (which was the best predictor model of this hierarchical regression) indicates that some, but not all, variables in the model were significant predictors of HSPA Mathematics performance. The significant variables were SES, student attendance, student mobility, LEP, students with disabilities, faculty attendance, faculty mobility, and school size.

LEP was a significant predictor in the model ($\beta = -.357$; $t = -10.220$; $p < .001$), contributing 12.7% (i.e., $(-.357)^2 = .127$) of the variance in NJ HSPA Mathematics performance. Schools

with a lower percentage of students classified as LEP perform better than schools with a higher percentage of these students.

Student mobility was also a significant predictor in the model ($\beta = -.290$; $t = -7.356$; $p < .001$), contributing 8.4% (i.e., $(-.290)^2 = .084$) of the variance in NJ HSPA Mathematics performance. Schools with lower student mobility rates performed better than schools with a higher student mobility rates.

Moreover, the percentage of disabled students (i.e., students receiving special education services) in a school was a significant predictor in the model ($\beta = -.251$; $t = -7.542$; $p < .001$), contributing 6.3% (i.e., $(-.251)^2 = .063$) of the variance in NJ HSPA Mathematics performance. Schools with lower percentages of students with disabilities performed better than schools with a higher disabled student percentage.

SES was also a significant predictor in the model ($\beta = -.170$; $t = -4.243$; $p < .001$), contributing 2.9% (i.e., $(-.170)^2 = .029$) of the variance in NJ HSPA Mathematics performance. Schools in regions of higher socioeconomic status performed better than schools in regions of lower socioeconomic status.

A school's faculty attendance rate was a significant predictor in the model ($\beta = .155$; $t = 4.545$; $p < .001$), contributing 2.4% (i.e., $(.155)^2 = .024$) of the variance in NJ HSPA Mathematics performance. Schools with higher faculty attendance rates performed better than schools with lower faculty attendance rates.

School size was a significant predictor in the model ($\beta = .140$; $t = 3.665$; $p < .001$), contributing 2.0% (i.e., $(.140)^2 = .020$) of the variance in NJ HSPA Mathematics performance. Larger schools performed better than smaller sized schools.

A school's faculty mobility rate was a significant predictor in the model ($\beta = -.105$; $t = -3.321$; $p = .001$), contributing 1.1% (i.e., $(-.105)^2 = .011$) of the variance in NJ HSPA Mathematics performance. Schools with lower faculty mobility rates performed better than schools with higher faculty mobility rates.

A school's student attendance rate was the last significant predictor in the model ($\beta = .080$; $t = 2.486$; $p = .014$), contributing .6% (i.e., $(.080)^2 = .006$) of the variance in NJ HSPA Mathematics performance. Schools with higher student attendance rates performed better than schools with lower student attendance rates.

Model 3 of this hierarchical regression appears to have no significant multicollinearity issues, since the VIF's for all the predictor variables in the model were less than 2.000. (CITE) The VIF's of the predictor variables in the other three models of this hierarchical regression were also all less than 2.000, suggesting that these models as well had no meaningful multicollinearity issues.

In the Mathematics HSPA hierarchical regression model, the significant predictor variables included the student-based variables LEP, student mobility, students with disabilities, SES, and student attendance, along with the faculty-based variables faculty attendance and faculty mobility as well as the school-based variable school size. Instructional minutes was not a significant predictor in the hierarchical regression. In the regression, the variables, which correlated positively with the dependent variable (as indicated by their standardized betas), were faculty attendance, school size, and student attendance. The other significant predictors – i.e., LEP, student mobility, students with disabilities, SES, and faculty mobility – all had negative correlations with the LAL HSPA pass rate. In the hierarchical regression model, LEP had the

strongest relationship with the dependent variable, followed by student mobility, students with disabilities, SES, faculty attendance, school size, faculty mobility, and student attendance, respectively.

Null Hypothesis 2:

No statistically significant relationship exists between total minutes of instructional time and the Grade 11 Mathematics scores on the 2011 New Jersey High School Proficiency Assessment when controlling for student, faculty, and school variables. The researcher retains the null hypothesis based on the data analysis and findings previously discussed. In both the simultaneous regression and hierarchical regression, total minutes of instructional time was not a statistically significant predictor variable of the variance in 11th grade Mathematics performance on the 2011 NJ HSPA between high schools. Further discussion and analysis of these results are included in Chapter V.

CHAPTER V

CONCLUSIONS AND RECOMMENDATIONS

INTRODUCTION

The conceptual appeal is clear: additional time allows teachers to “cover more material and examine topics in greater depth and in greater detail, individualize and differentiate instruction, and answer students’ questions” (Farbman, 2012). In regards to the influence in the educational process, the limited research on the subject of instructional time is evident. Total instruction time and the allocation of time to specific subjects vary. A cursory look at studies examining the correlations between average instruction time and student test scores is sufficient to raise doubt that there is a simple relationship (Scheerens, 2014) between the two.

The tendency of educational practitioners to recommend additional instructional time is often motivated by the argument that more time is needed to close the gap between the performance levels of individual students. The variations of instructional time should be considered carefully, as the marginal gains from more instructional time might be too low compared to alternative uses of time, the quality use of time and the financial resources needed for additional instruction time. The limited research regarding instructional minutes at the high school, in spite of its importance and cost, encouraged my objective to analyze the influence of instructional minutes on student achievement on the 2011 Language Arts and Mathematics New Jersey High School Proficiency Assessment.

Purpose

The purpose of this study was to explore the strength and direction of the relationship between instructional time and the academic achievement of New Jersey 11th grade public high school students based on the data collected from the 2011 New Jersey State Report Card and

New Jersey High School Proficiency Assessment for Language Arts and Mathematics. This study included student, faculty and school variables. The student variables related to attendance, mobility, LEP, socioeconomic status and students with disabilities. Faculty variables included attendance, credentials and mobility. The school variables related to enrollment, length of school day and instructional minutes. Instructional time has become an important aspect in school reform discussions, as many champion for increases in time devoted to mathematics and reading instruction and a shortage of compelling empirical evidence has hindered the decision-making process (Rivkin & Schiman, 2015). This study adds to current body of literature on the influence of instructional time in relation to student achievement.

Organization of the Chapter

This chapter focuses on a summary of the research findings including the research questions, null hypotheses, and findings. Additionally, this chapter administers recommendations for policy, practice and future research.

Summary of Findings

This study presents documented evidence to the influence of instructional time on student achievement in Language Arts and Mathematics on the 2011 New Jersey High School Proficiency Assessment. The overarching research question, subsidiary research questions, null hypotheses and findings for each research question are listed below.

The overarching research question for the study was; what is the influence of instructional minutes on Grade 11, 2011 New Jersey state-mandated High School Proficiency Assessment (HSPA) scores when controlling for student, school, and staff variables?

Through statistical analysis using Simultaneous Multiple Regression, as well as Hierarchical Regression it was found that the amount of instructional minutes for a school did not have a statistically significant impact on 11th grade student achievement on the 2011 New Jersey High School Proficiency Assessment in Language Arts and Mathematics. No statistical significant relationship exists between instructional time and the 2010-2011 NJ HSPA Language Arts and Mathematics scores when controlling for, student, faculty and school variables.

Subsidiary Research Question 1: What is the strength and direction of the relationship between instructional minutes on the Grade 11, 2011 New Jersey state-mandated High School Proficiency Assessment (HSPA) scores in Language Arts when controlling for student, faculty and school variables?

Null Hypothesis 1: No statistically significant relationship exists between instructional minutes and the Grade 11 Language Arts scores on the 2011 New Jersey High School Proficiency Assessment when controlling for student, staff and school variables.

Findings for Research Question 1: The researcher maintains the null hypothesis based on the interpretation and analysis of the data in Chapter IV. The simultaneous regression and the hierarchical regression determined that total number of instructional minutes was not a significant predictor of the explained variance in a school's grade 11 Language Arts performance on the 2011 NJ HSPA.

The process used to respond to Research Question 1 began with running a simultaneous regression to evaluate the significance of each variable. The dependent/outcome variable was the NJ HSPA LAL. The Adjusted R Square was .796 which indicates that 79.6% of the variance in the dependent variable can be predicted by the 11 independent variables. The variables included SES, faculty mobility, students with disability, faculty credentials, instructional minutes, student

attendance, faculty attendance, LEP, school size, student mobility and length of school day. The variables with statistical significance were LEP ($<.001$), student mobility ($<.001$), student with disability ($<.001$), SES ($<.001$), faculty attendance ($<.001$), school size ($<.01$), faculty mobility ($<.01$), and student attendance ($<.05$). Model 3, which does not include the variable of interest, instructional minutes, as a predictor, was selected as the best predictive model as opposed to Model 4, which does include instructional minutes, due to the fact that the Model 4 F change statistic was not significant.

These results were followed by a hierarchical regression which comprised of all variables except faculty credentials and length of school day, and – as a result of their potential for multicollinearity issues. In the LAL HSPA hierarchical regression model, the significant predictor variables included the student-based variables LEP, student mobility, students with disabilities, SES, and student attendance, along with the faculty-based variables faculty attendance and faculty mobility as well as the school-based variable school size. Instructional minutes was not a significant predictor in the hierarchical regression. For the hierarchical regression, the first model included the student variables related to disability, SES, attendance and mobility. The second model added in the faculty variables related to mobility and attendance. The third model included school size. The final model included the variable of interest, which was the total number of instructional minutes during the school day.

The best predictive model was Model 3. The Adjusted R square for Model 3 was .796, which means that 80% of the variance can be explained by Model 3. Approximately, 15% of the variance of Model 3 can be explained by the predictor for LEP. The negative beta indicates that as the percentage of LEP students increases, the percentage of students Proficient or Advanced Proficient on the New Jersey High School Proficiency Assessment decreases ($B = -$

.381, $p < .001$).

Approximately, the predictor for student mobility can explain 11% of the variance of Model 3.

The negative beta indicates that as the rate of student mobility increases, the percentage of students Proficient or Advanced Proficient on the New Jersey High School Proficiency Assessment decreases ($B = -.334$, $p < .001$).

Approximately, 6% of the variance of Model 3 can be explained by the percentage of disabled students. The negative beta indicates that as the percentage of disabled students increases, the percentage of students Proficient or Advanced Proficient on the New Jersey High School Proficiency Assessment decreases ($B = -.381$, $p < .001$).

Approximately, the predictor for SES can explain 2% of the variance of Model 3. The negative beta indicates that as the rate of SES increases, the percentage of students Proficient or Advanced Proficient on the New Jersey High School Proficiency Assessment decreases ($B = -.154$, $p < .001$).

Approximately, the predictor for faculty attendance can explain 2% of the variance of Model 3. The negative beta indicates that as the rate of faculty attendance increases, the percentage of students Proficient or Advanced Proficient on the New Jersey High School Proficiency Assessment decreases ($B = -.137$, $p < .001$).

Approximately, the predictor for school size can explain 1% of the variance of Model 3. The positive beta indicates that as the rate of school size decreases, the percentage of students Proficient or Advanced Proficient on the New Jersey High School Proficiency Assessment increases ($B = .107$, $p < .001$).

Subsidiary Research Question 2: What is the strength and direction of the relationship between instructional minutes on the Grade 11, 2011 New Jersey state-mandated High School Proficiency Assessment (HSPA) scores in Mathematics when controlling for student, staff and school variables?

Null Hypothesis 2: No statistically significant relationship exists between instructional minutes and the Grade 11 Mathematics scores on the 2011 New Jersey High School Proficiency Assessment when controlling for student, staff and school variables.

Findings for Research Question 2: The researcher maintains the null hypothesis based on the interpretation and analysis of the data in Chapter IV. The simultaneous regression and the hierarchical regression determined that total number of instructional minutes was not a significant predictor of the explained variance in a school's grade 11 Mathematics performance on the 2011 NJ HSPA.

The process used to respond to Research Question 1 began with running a simultaneous regression to evaluate the significance of each variable. The dependent/outcome variable was the NJ HSPA Mathematics. The Adjusted R Square was .714 which indicates that 71.4% of the variance in the dependent variable can be predicted by the 11 independent variables. The variables included SES, faculty mobility, students with disability, faculty credentials, instructional minutes, student attendance, faculty attendance, LEP, school size, student mobility and length of school day. The variables with statistical significance were LEP ($<.001$), student mobility ($<.001$), student with disability ($<.001$), SES ($<.001$), faculty attendance ($<.001$), school size ($<.001$), faculty mobility ($<.01$), and student attendance ($<.05$). Model 3, which does not include the variable of interest, instructional minutes, as a predictor, was selected as the best

predictive model as opposed to Model 4, which does include instructional minutes, due to the fact that the Model 4 F change statistic was not significant.

These results were followed by a hierarchical regression which comprised of all variables except faculty credentials and length of school day, and – as a result of their potential for multicollinearity issues. In the Mathematics HSPA hierarchical regression model, the significant predictor variables included the student-based variables LEP, student mobility, students with disabilities, SES, and student attendance, along with the faculty-based variables faculty attendance and faculty mobility as well as the school-based variable school size. Instructional minutes was not a significant predictor in the hierarchical regression. For the hierarchical regression, the first model included the student variables related to disability, SES, attendance and mobility. The second model added in the faculty variables related to mobility and attendance. The third model included school size. The final model included the variable of interest, which was the total number of instructional minutes during the school day.

The best predictive model was Model 3. The Adjusted R square for Model 3 was .765, which means that 80% of the variance can be explained by Model 3. Approximately, 13% of the variance of Model 3 can be explained by the predictor for LEP. The negative beta indicates that as the percentage of LEP students increases, the percentage of students Proficient or Advanced Proficient on the New Jersey High School Proficiency Assessment decreases ($B = -.357, p < .001$).

Approximately, the predictor for student mobility can explain 8% of the variance of Model 3. The negative beta indicates that as the rate of student mobility increases, the percentage of students Proficient or Advanced Proficient on the New Jersey High School Proficiency Assessment decreases ($B = -.290, p < .001$).

Approximately, 6% of the variance of Model 3 can be explained by the percentage of disabled students. The negative beta indicates that as the percentage of disabled students increases, the percentage of students Proficient or Advanced Proficient on the New Jersey High School Proficiency Assessment decreases ($B = -.251, p < .001$).

Approximately, the predictor for SES can explain 3% of the variance of Model 3. The negative beta indicates that as the rate of SES increases, the percentage of students Proficient or Advanced Proficient on the New Jersey High School Proficiency Assessment decreases ($B = -.170, p < .001$).

Approximately, the predictor for faculty attendance can explain 2% of the variance of Model 3. The negative beta indicates that as the rate of faculty attendance increases, the percentage of students Proficient or Advanced Proficient on the New Jersey High School Proficiency Assessment decreases ($B = -.137, p < .001$).

Approximately, the predictor for school size can explain 1% of the variance of Model 3. The positive beta indicates that as the rate of school size decreases, the percentage of students Proficient or Advanced Proficient on the New Jersey High School Proficiency Assessment increases ($B = .140, p < .001$).

Approximately, the predictor for faculty mobility can explain 1% of the variance of Model 3. The positive beta indicates that as the rate of faculty mobility decreases, the percentage of students Proficient or Advanced Proficient on the New Jersey High School Proficiency Assessment increases ($B = .105, p < .001$).

Approximately, the predictor for student attendance can explain .6% of the variance of Model 3. The positive beta indicates that as the rate of student attendance increases, the percentage of students Proficient or Advanced Proficient on the New Jersey High School Proficiency

Assessment decreases ($B = .080$, $p = .014$).

The researcher maintains the null hypothesis based on the interpretation and analysis of the data in Chapter IV. The simultaneous regression and the hierarchical regression determined that total number of instructional minutes was not a significant predictor of the explained variance in a school's grade 11 Mathematics performance on the 2011 NJ HSPA.

Recommendation for Policy and Practice

Lavy (2015) examined student achievement, estimating the effects of instructional time using PISA 2006 data. The study exploited within-student and within-school variation by subject (reading, mathematics and science), estimating student fixed effects. He found that instructional time has a positive and significant effect on test scores. Instructional time has become an important aspect in school reform discussions, as many champion for increases in time devoted to mathematics and reading instruction and a shortage of compelling empirical evidence has hindered the decision-making process (Rivkin & Schiman, 2015). What are some of the ways in which we can optimize the time that students spend in the classroom? Engaging a schools' leadership team in an assessment and discussion of how well their schools are using time currently is an optimal first step. When you are aware of the pockets of time that are lost due to time consuming activities, leadership can make every minute count in their schools by strengthening core instruction and improving bell-to-bell teaching strategies. This can be done by making high profile changes in school routines, rules, and norms that signal a commitment to maximizing learning time.

Schools can focus on educating families about the importance of attendance starting in the early years by sharing student achievement data disaggregated by levels of absenteeism and

the absentee data for their child. Once families begin to receive student data with this focus, attendance will become a latent priority as students advance through their academic career.

Schools should look to partner with community agencies that can reach out and offer resources to help chronically absent students and families once they have regularly review data to identify problematic and positive attendance patterns by grade, student population, and classroom. On a building level, schools can consider assigning classrooms for clusters of students in close proximity to one another to minimize transitions during the day (i.e.. a classroom bloc).

Recommendations for Future Research

Being that the effectiveness of a teacher can have a significant influence on student achievement (Grossman, 2010), studies regarding instructional minutes among higher and lower achieving classrooms within a district may illuminate policy and practice initiatives.

There was limited data on the specific amounts of time that schools dedicate to Language Arts and Mathematics. This detailed data could be used to improve targeted content area. An increase in instructional time is only as powerful as the level of instruction students are receiving during additional instructional time (Long, 2014).

Being that one exploratory study cannot provide all encompassing solutions to student achievement, in an attempt to make the literature more complete, a comparison of one group's result on another standardized test measure (i.e., end-of-year Biology test, SAT scores, AccuPlacer).

Future studies could explore how operational extended blocks schedules are impacting teaching and learning. Quality instructional time may impact high-stakes assessments by itself (Knuchel, 2010), but the quality of the additional time students receive in an extended block should be investigated further. The evidence is not clear on the emanation of block scheduling on student achievement. Regardless of the methodology used to determine the effectiveness of block scheduling reform (Gullat, 2008).

Conclusion

In conclusion, the null hypotheses for the subsidiary research question regarding NJ HSPA Language Arts and Mathematics that was posited in this paper was retained. The results of this study indicate that there was not a statistically significant relationship between total minutes of instructional time and passing percentages (defined as attaining either a proficient or an advanced proficient score) on the Grade 11 Language Arts and Mathematics scores on the 2011 New Jersey High School Proficiency Assessment. Of the variables included in this study, LEP, student mobility, student with disabilities, SES, faculty attendance, school size, faculty mobility and student attendance were found to be statistically significant predictors of student achievement in each of the Language Arts and Mathematics regressions that were conducted. For both Language Arts and Mathematics, faculty attendance, school size, and student attendance all had positive correlations with the respective dependent variable, while LEP, student mobility, students with disabilities, SES, and faculty mobility all had negative correlations with the outcome variable. Furthermore, for each of these significant predictors the strength of the relationship between the given predictor and the dependent variable (as measured by the magnitude of the standardized beta) was similar for both Language Arts and Mathematics. This suggests that comparable factors affect school performance on both the Language Arts and

Mathematics sections of the NJ HSPA examination and that both the direction and the magnitude that each of these factors has on test performance is similar for both subjects.

This study adds to the body of literature about instructional time and student achievement. In a data driven society, school administrators and other influential policy makers may impudently look to instructional time as a way of effecting change. Unlike some school reforms, adjusting the way in which time is allotted can be impactful. This resource offers a valuable change to help schools and students increase achievement.

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