

STUDENT ACHIEVEMENT IN LOWER SES HIGH SCHOOLS

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John F. Kennedy said, “Let us think of education as the means of developing our greatest abilities, because in each of us there is a private hope and dream which, fulfilled, can be translated into benefit for everyone and greater strength for our nation.” I hope that I can apply what I have learned throughout my schooling to benefit others, as I am the product of good teachers. The completion of my program has given me great tools that I will utilize to improve the education and lives of others. To everyone who has been a part of my journey, I thank you.

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ABSTRACT

STUDENT ACHIEVEMENT IN LOWER SES HIGH SCHOOLS

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The No Child Left Behind Act of 2001 legally mandated that all public school students in grades 3-8 and once in high school attain proficiency in language arts and mathematics by 2014. While student achievement has increased in elementary and middle schools, little progress has been made at the high school level (USDOE, 2010). Specifically, trends in the nation's report card show that scores in language arts and mathematics for 17 year olds have remained nearly unchanged for over thirty –five years. With a growing sense of urgency to meet AYP goals, school leaders, especially those working in lower SES environments need practical strategies for increasing student achievement based on sound methodological research. One perspective on student achievement suggests that proximal variables (close to the learner) influence student achievement (Wang, Haertal, & Walberg, 1993). The purpose of this study was to investigate four proximal variables of interest (curriculum quality, non-curricular school-level variables that influence instruction, facility quality, and school safety) that school leaders might manipulate which may positively influence high school student achievement.

Four research questions were developed to examine the relationships between curriculum quality, non-curricular school-level variables that influence instruction, facility quality, and school safety and high school student achievement in language arts

literacy and mathematics. A fifth exploratory question was created to possibly find if a predictive model for achievement could be developed based on the predictability or the variables of interest. The unit of analysis was the high school. Seventy-one school leaders with direct knowledge of the high school provided survey data on curriculum quality and facility quality. The researcher developed measures of average high-school student achievement, school-level instructional quality characteristics, and school safety from three archived databases. Multiple regression procedures were applied to identify relationships between the predictor variables and student achievement.

Curriculum quality strongly predicted high school achievement. Other significant predictors of student achievement included the percentage of highly qualified teachers, and quality of the proximal learning environment as a facilities measure. A minimal relationship was found between the variables associated with school safety and student achievement. Deeper analysis suggested possible validity issues within the self-reported New Jersey school safety data. Implications of the findings are discussed.

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CHAPTER I

INTRODUCTION

On January 8, 2002, President George W. Bush signed into law The No Child Left Behind Act of 2001 (PL 107-110), a reauthorization of the Elementary and Secondary Education Act (ESEA). The Act mandated that “all children have a fair, equal, and significant opportunity to obtain a high-quality education and reach, at a minimum, proficiency on challenging State academic achievement standards and state academic assessments” (20 U.S.C. 6301, sec 1001). Under the NCLB Act, all public school students tested in grades 3-8 and once at the high school level are to be proficient in Language Arts and mathematics by 2014, regardless of ability, ethnicity, or socioeconomic background. The Act also required states to provide time lines in 1, 2 or 3 year intervals for achieving 100% proficiency in regular education by 2014. These benchmarks are known as adequate yearly progress indicators. Schools and districts that fail to make adequate yearly progress were to face sanctions that included corrective action, reconstitution or the loss of federal government funds.

The Nation’s Report Card, compiled by the United States Department of Education reveals that in recent years, high school achievement in both reading and mathematics on average has remained flat or has declined (USDOE, 2009). High school achievement in New Jersey mirrors this trend. The New Jersey Department of Education reported similar results since 2002 on the NJ High School Proficiency Assessment

(NJDOE, 2009a; Tramaglini, 2010). Language arts and mathematics results for NJ and for the nation suggest a gap in student achievement between minority groups and White students and a gap in student achievement between lower and higher socioeconomic groups (see Appendix A).

Appendix A shows the projected improvement in student achievement on the state high school proficiency assessment by socioeconomic groups from 2002-2014.

Projections show that secondary students in the DE, FG, GH, I, and J District Factor Groups (a district-level socioeconomic rating system used for assessing academic outcomes and providing court related parity measures) may end up within a reasonable range of the goal -- 100% proficiency -- in language arts literacy and mathematics.

Secondary school achievement in the A, B, and CD District Factor Groups, however, will likely remain 19.1% to 41.4% away from the 100% goal in language arts literacy and 31.2% to 53.8% away from 100% in mathematics. In other words, lower socioeconomic status high schools in New Jersey had already embarked on inadequate trajectories toward reaching AYP goals in 2014. When the No Child Left Behind Act was passed, the preliminary high school benchmarks in New Jersey were set at 73% for language arts literacy and 55% for mathematics (NJDOE, 2009a). As the data in Appendix A suggest, A, B, and CD high schools have registered gains in student achievement. Yet these gains have been and remain far from the rates of growth needed to make 100% proficiency in 2014.

The NCLB Act was designed to ensure that “all children have a fair, equal, and significant opportunity to obtain a high-quality education and reach, at a minimum, proficiency on challenging state academic achievement standards and state academic

assessments” (20 U.S.C. 6301, sec 1001). Specifically, the primary purpose as written in the legislation of the NCLB Act was “to the close the achievement gap” (20 U.S.C. 6301, *An Act*) between all students regardless of their race, ethnicity, socioeconomic status, learning differences, or language by 2014. However, little progress may be evident among lower SES high schools in particular.

Purpose

New Jersey administrators of lower socioeconomic-status high schools face a daunting challenge: raise student achievement or face the accountability measures associated with the NCLB Act (see Appendix B). Despite evidence from researchers who support the notion that school leaders can make a difference (Elmore, 2002; Fullan, 2001; Hallinger & Heck, 1998; Knapp, Copland, & Talbert, 2003; Marzano, Waters, & McNulty, 2005), the current growth trends suggest that leaders in lower SES high schools need better knowledge of effective technologies for achieving the progress necessary to achieve critical academic performance goals. They continue to need guidance from methodologically sound research (Dewey, 1938; English & Papa, 2010). Lower SES high schools face growing pressures to improve student achievement in language arts literacy and mathematics. The purpose of this study was to investigate four proximal variables (curriculum quality, non-curricular school-level variables that influence instruction, facility quality, and school safety) that high school leaders could modify in hopes of promoting higher student achievement in reaction to the challenging accountability pressures that public schools now confront.

Proximal Variables and Student Achievement

In 1993, Wang, Haertal and Walberg conducted a meta-analysis to develop a better understanding of how school leaders can influence student learning and achievement. Their study investigated hundreds of empirical studies focusing on the different variables that are associated with higher student achievement. The researchers concluded that variables more closely aligned with students' defining characteristics and educational experiences, meaning experiences proximal to the learner, have a greater influence over learning than variables indirectly related to daily experiences. For example, classrooms practices and the curriculum implementation have a stronger influence on learning than does national policy, governance, and statute.

Curriculum quality may be a critical antecedent of high school student achievement also. Curriculum provides a content path to defined educational goals for teachers to teach and students to learn (Tanner & Tanner, 2007), yet few recent empirical studies have been conducted that investigate the relationship between the quality of the curriculum and student achievement. Different from the quality of curriculum, other variables in schools influence the instruction of the teacher. Each year, the New Jersey Department of Education collects numerous data on these variables for the school report card. Rarely is influence of these variables on student achievement at the high school level explored in empirical studies. Some researchers argue that a positive correlation exists between the quality of the facility (physical plant and learning structure) toward student achievement (Earthman, Cash, & Van Berkum, 1995; Earthman & Lemasters, 1996, October; 1997; McGuffey, 1982; Weinstein, 1979). However, little is known about the relationship between quality of the facility and student achievement in New Jersey

high schools. In addition, high school safety may be a critical antecedent of high school achievement, if teachers are to teach and students are to learn. Some researchers suggest that school safety does matter with regards to addressing student achievement (Cornell & Mayer, 2010; Elliot, Hamburg & Williams, 1998). Provided the current student achievement trajectories in lower SES high schools (see Appendix A) toward 100% proficiency in 2014, a great deal more research is needed to better understand the correlates of student achievement and to reset the conditions for student success.

Statement of the Problem

The No Child Left Behind Act of 2001 mandated that all public high school students attain proficiency in language arts and mathematics by 2014. High schools were required to make Adequate Yearly Progress toward the 100% criterion in their total population and subgroups. According to the law, schools that fail to make AYP would face consequences from corrective action to restructuring (see Appendix B). In the most recent NCLB data set (2007-2008), nearly half (46%) of the high schools in New Jersey did not make AYP (NJDOE, 2008c). A large proportion of these high schools were in lower socioeconomic school districts (59%). With the benchmarks constantly increasing toward 100%, New Jersey high schools, specifically those in lower socioeconomic communities are in danger of not meeting the mandate of 2014.

High school leaders in lower socioeconomic areas face an urgent need to increase student achievement by 2014. However, researchers (Elmore, 2000, 2002; English & Papa, 2010; Levine, 2005) contend that school leaders may not have the knowledge or skills available to reform schools or to improve achievement. Yet, previous empirical

work suggests that improvements in curriculum, instruction, facilities, and school safety could stimulate improvements in student learning (Aiken, 1942; Cresswell, 2004; Crotteau, 2002; Darling-Hammond & Youngs, 2002; Earthman & Lemasters, 1996, October; Hawkins, Farrington, & Catalano, 1998; Jacobs, 2004; Leone, Mayer, Malmgren, & Meisel, 2000; Mayer, 2006; Mayer & Leone, 2007; Picus, Marion, Calvo, & Glenn, 2005; Reed, 2005; Tanner, 1975; Tanner & Tanner, 2007; Thompson & Massat, 2005).

Figure 1 includes directional arrows pointed toward student achievement in the conceptual framework although correlation research alone cannot establish causation. Implicit arrows linking the four predictors were omitted. Curriculum quality refers to three curricular attributes likely related to student achievement. These attributes are curriculum design, curriculum development, and forces that influence curriculum. School-level variables that influence instruction include a cluster of nine concepts that refer to system resources utilized for instruction. These variables are the percentage of special education students, average class size, percentage of teachers with conditional certificates, the percentage of highly qualified teachers, student to faculty ratio, Internet connectivity, student to computer ratio, and total instructional time. The variable facility quality consists of four attributes, which are the physical environment, the learning environment, technology and safety and security. Finally, school safety refers to five characteristics that contribute to the climate of the school. These characteristics are incidents of violence, vandalism, substance abuse, weapons and bullying.

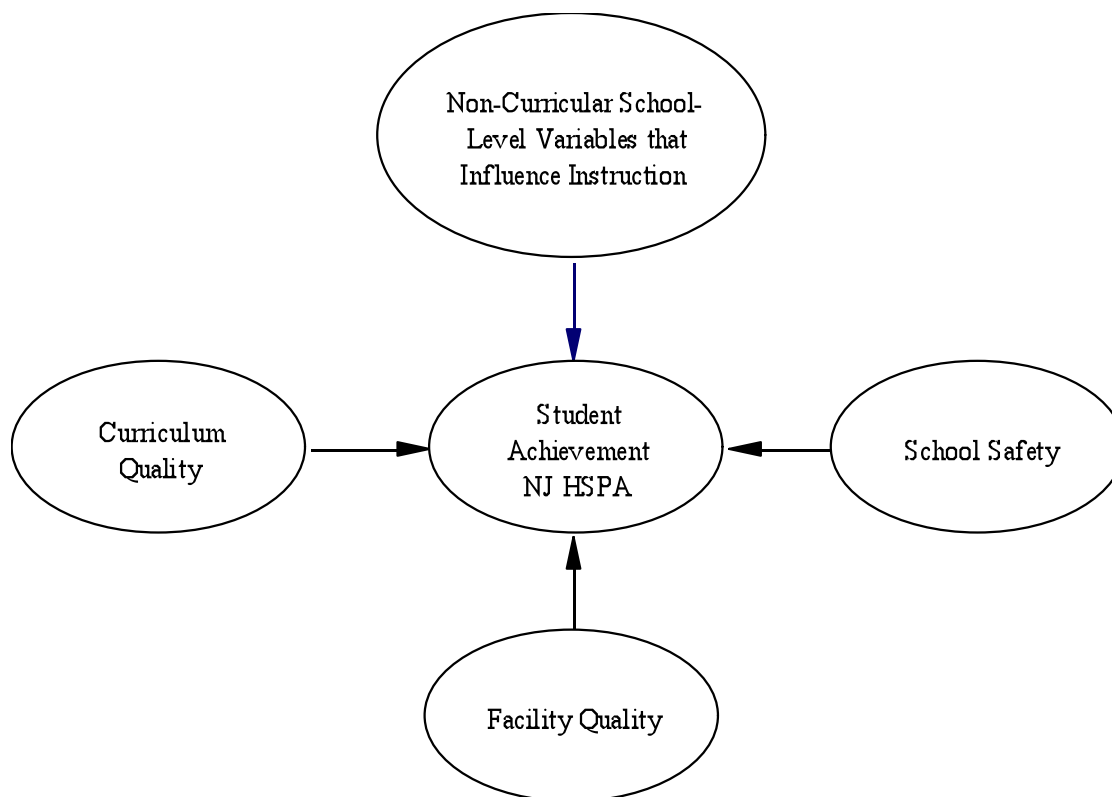


Figure 1. Conceptual framework.

Research Questions

1. What is the relationship between curriculum quality and student achievement?
2. What is the relationship between instructional quality and student achievement?
3. What is the relationship between facility quality and student achievement?
4. What is the relationship between school safety and student achievement?
5. What is the best model for student achievement predicted by a combination of curriculum quality, instructional quality, facility quality, and school safety?

CHAPTER II

REVIEW OF THE LITERATURE

The No Child Left Behind Act (PL 107-109) mandates that all high school students (100%) score proficient on statewide assessments by the year 2014.

Notwithstanding the impact of this statute, high schools across New Jersey, especially those in lower socioeconomic communities, have shown minimal growth since President George W. Bush signed NCLB into effect on January 8, 2002. As documented in numerous studies and shown in Appendix A, generally there is a positive relationship between socioeconomic status and student achievement. Lower school district affluence usually foreshadows reduced student achievement in language arts literacy and mathematics. The relationship between SES and average student achievement has been one of the most enduring or intractable relationships in all education research. There is a critical level of urgency for high schools, especially high schools in lower socioeconomic areas, however, to break the link between SES and average student achievement and to improve average proficiency levels among all groups of students.

School leaders in lower socioeconomic high schools in New Jersey need practical vehicles using sound methodological research to provide guidance for increasing student achievement on the New Jersey High School Proficiency Assessment. With regard to achievement, the Wang, Haertel, and Walberg meta-analysis of hundreds of studies (1993) suggested that proximal variables are more likely than distal variables to influence

achievement. While this meta-analysis was conducted over fifteen years ago, more recent research suggests that Wang and her colleagues were insightful and correct with regard to proximal variables (Cresswell, 2004; Crook, 2006; Darling-Hammond, 2006; Keller, 2007; Lyons & Algozzine, 2006; McFarland, 2005; Osher, Dwyer, & Jimerson, 2006; Picus, Marion, Calvo, & Glenn, 2005; Rivkin, Hanushek, & Kain, 2005; Speilhagen, 2006; Tanner, 1975; Tanner & Tanner, 2007; Thompson & Massat, 2007; Wayne & Youngs, 2003).

The purpose of this investigation was to operationalize four proximal constructs -- curriculum quality, non-curricular school-level variables that influence instruction, facility quality, and school safety -- and to show how each may be related to average student achievement in lower SES high schools. By showing how these variables influence student achievement at the high school level, leaders may develop more strategic approaches to reset organizational conditions for increasing student achievement towards the 100% mandate by 2014.

Overview, selection of literature and Review Process

The review of literature focused on four broadly defined independent variables, each having implications on student achievement at the high school level: curriculum quality, non-curricular school-level variables that influence instruction, facility quality, and school safety (see Figure 2). Notwithstanding a certain amount of continuing cynicism over the extent to which schools vary in promoting student achievement, the reality is that practitioners need methods for increasing student achievement. The review of literature led to four specific research questions and hypotheses to investigate the

possible relationships between each of the variables and student achievement. A final research question was added to further explore a possible model for student achievement at the high school level that might guide future research and practice.

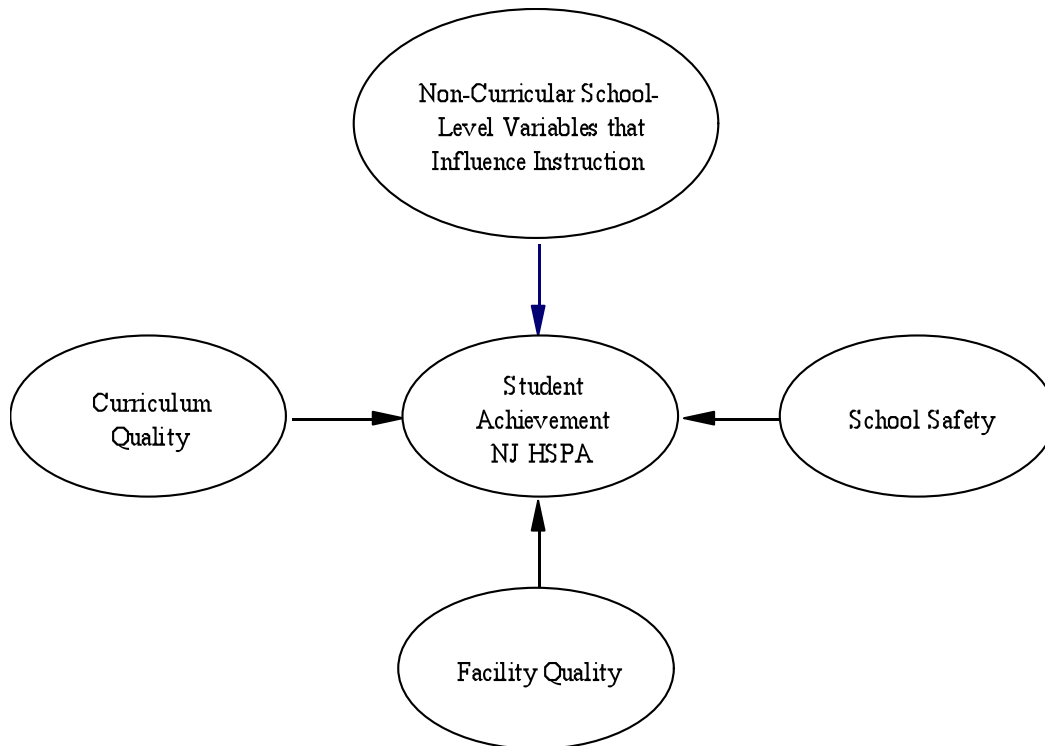


Figure 2. Organizer for literature review.

The breadth, depth, and nature of the research literature varied for each of the four areas. In accordance with recent changes in the field requiring stronger adherence to evidenced-based practice and rigorous research methodologies (Berliner, 2002; Kelly, 2006; Mayer, 2001; Slavin, 2002, 2007), the review of the literature focused primarily on peer-reviewed empirical work conducted at the high school level. The majority of previous studies covered in this review were published since 2002, after the No Child

Left Behind Act of 2001. It is not coincidental that attention to average student achievement in lower SES schools has grown since the passage of NCLB. NCLB has re-focused national attention on student achievement for all groups of students, and has created new and urgent research opportunities.

The review of the literature was conducted through a multi-step procedure that included: (a) searching major electronic databases and indexes such as JSTOR, ERIC, and ProQuest, (b) reading and coding manuscripts by time period, type of research, primary focus topic, relation to the main independent and dependent variable(s) of interest, and (c) including and excluding articles relative to their application to this study. Only peer-reviewed empirical studies and reviews were selected for use in this study. These studies were published mainly after the advent of the No Child Left Behind Act of 2001. However, where necessary, seminal research in each of the areas of interest was utilized to strengthen the review of the literature.

Curriculum Quality

Schools are typically structured around a course of predetermined, required subject matter that students must pass to graduate (Au, 2007). Curriculum, which derives from the Latin word, *currere*, meaning to run a course (Eisner, 1994), serves as the “reconstruction of knowledge and experience that enables the learner to grow in exercising intellectual control of subsequent knowledge and experience” (Tanner & Tanner, 2007, p. 99). The curriculum is the conduit made up of the total educational program and the individual courses within, that focus on the goals and outcomes of the educational institution (Tyler, 1949). The curriculum paradigm represents a theoretical

framework for empirical research on curriculum and student achievement. The synthesis of the literature indicated two major themes of curriculum quality: curriculum design and the process of curriculum development. A third theme, the forces that influence curriculum is embedded through the first two themes and represents different representations of influences on the curriculum from the literature.

The Curriculum Paradigm

Tanner (1975) synthesized nearly 100 years of empirical research connecting curriculum and various characteristics of schools, including student achievement. Empirical research such as the Eight Year Study and subsequent studies (Aiken, 1942; Giles, McCutchen, & Zechiel, 1942; Smith & Tyler, 1942; Tyler, 1966; Wrightstone, 1935) supports the curriculum paradigm. The curriculum paradigm constructed by Tanner (1975) suggests that curriculum can be described in three basic principles: a curriculum should not violate the nature of the learner as an active constructor of meaning, should be organized as a fusion of subject matter knowledge and personal experience, should acknowledge that students develop cognitively and socially in stages, not finite periods of time, and should be sensitive to social forces and developed in a democratic fashion (Dewey, 1902; 1938; Tanner 1975; Tyler 1949). Although a few researchers have argued against the curriculum paradigm (Barrow, 1984, 1988; Hirsch, 1998; Jickling, 1988), Tanner and Tanner (1988) urged that the curriculum paradigm does not end debate for how curriculum should be designed or developed, but serves as a guide in that debate by focusing attention on what has been found and what has not.

Accordingly, the review of literature was organized into three categories: curriculum design, curriculum development, and forces that influence curriculum. The review included both the seminal and subsequent research in the field. Curriculum design refers to the actual structure of the total program and the individual courses comprised by the program. Curriculum development is the process for developing and maintaining the curriculum. Because of their symbiotic relationship with curriculum design and development, forces that influence curriculum are manifested in both curriculum design and curriculum development.

Curriculum Design

Goals. Quality curriculum designs have goals that focus on organizational outcomes, such as increased student achievement (Dewey, 1941; English & Steffy, 2001; Tyler, 1949). Studies conducted by Presseisen (1985) and Hlebowtzh (1987) found many curricular reforms fail because there were not clear sets of goals and criteria that allowed organizations to balance reforms with practice. Goals provide schools the avenue to focus on meaningful educational objectives. Leithwood and Prestine's (2002) study of a school district in Illinois amplified this notion. Their research documented how schools in the Fairview district developed goals for student achievement and success and worked to attain action strategies to meet those goals. Such goals helped these schools to focus on the alignment of curriculum build professional development experiences that supported the design of the curriculum, even when state mandated standards and assessments pressured the district to take educational short cuts.

When curricular goals are absent or lose priority in schools, reforms or mandates may drive attention away from authentic student learning. For example, Linn, Baker, and Betebenner (2002) posited that federal accountability statutes such as the No Child Left Behind Act of 2001 displace school practices such as curriculum development with greater emphasis on the tactics of test taking. Au's (2007) qualitative metasynthesis of 49 qualitative studies of how state and federal initiatives affect curriculum found that high stakes assessments change the goals of schools and teachers, as well as curricular goals by narrowing content to the material most likely to be assessed. Further, teachers lost the ability to gear learning of the curriculum toward student needs. Instead, curriculum became a transmission of facts that were found on the assessments (p. 263). Deviating from the goals fragments curriculum and instruction, and leads to gaps in learning from grade to grade (English & Steffy, 2001; Tanner, 1997). Quality curriculum has clearly defined goals and seeks mandates and initiatives as opportunities for growth that support curricular outputs (Leithwood & Prestine, 2002).

Content. High-quality curriculum entails articulated and coordinated content aligned to the curriculum paradigm (Tanner, 1975; Tanner & Tanner, 2007). Specifically, curriculum content should be designed as a road map for attaining curriculum goals, while signifying that all children learn differently (e.g., Erikson, 1950; 1968; Kohlberg, 1970; Piaget, 1950; 1970) and that knowledge is a fusion of the disciplines and personal experience (Dewey, 1902; 1938; Parkay, 2000). Empirical testing of this occurred in the early half of the twentieth century. Several experimental and quasi-experimental studies involving thousands of children in various environmental

contexts demonstrated that when the design balances student needs, knowledge, and reform in a progressive manner, student success (e.g., student achievement) is likely to occur (Aiken, 1942; Jersild, Thordike, & Goldman, 1941, Wrightstone, 1935). More recent empirical research and educational policy indicates that quality curriculum designs focus on student needs. For instance, Bloom (1956, 1976), and later Anderson and Krathwohl (2001), structured the cognitive domain around different levels of learning which are an integral part of learning objectives found in most curricula. Other researchers have provided more current examples of practices that embrace aspects of the curriculum paradigm and the connection to higher student achievement (Marzano, Pickering, & Pollock, 2001; Zhao, 2009).

In the No Child Left Behind Era, the standardization of curriculum content has become an integral part of every public school that accepts federal funding. Standards provide a set framework for teachers to teach and students to learn within (Tanner & Tanner, 2007); however, there is little empirical evidence that standardized content yields higher achievement scores. Empirical research, however, does suggest that standards provide a skeleton of content for curriculum designs to serve as a framework of content, which can be designed towards curricular goals.

Schools and school districts that create high-quality curriculum take universal content standards as a starting point and exceed essential benchmarks over time. A case-study highlighting 4 years of curriculum alignment in a California urban high school, Cresswell (2004) found that one of the most important factors in increasing student achievement was the extensive use of state content standards as a basis for curricular development. Aligning curriculum to content standards allowed teachers to progress

toward shared academic goals and objectives. These shared goals and objectives were designed with the flexibility to surpass minimum benchmarks for student learning. While some students' learning experiences were targeted toward the minimum content standards, the curriculum allowed teachers to design enhancements and enrichments to learning focused on higher-learning experiences. Student achievement over time exceeded minimum benchmarks and students in urban communities overcame traditional barriers and limitations to student achievement.

McFarland (2005) reported that when lower socioeconomic high schools aligned their curriculum to content standards, and integrated objectives with high-leveled learning objectives, teachers align their instruction to attain those high standards. When curriculum was designed to promote instruction that was flexible, higher cognitive outputs were attained that positively influenced achievement. Teachers utilized the curriculum as an instructional tool. Lessons reflected the curriculum but were geared toward student learning needs fostering high achievement.

McCaffrey, Hamilton, Stecher, Klein, and Robyn (2001) found that when teachers changed their instruction to meet a high-quality, standards-based curriculum, students were more likely to increase achievement of curriculum goals than students in traditional, non-standards based classrooms. In traditional schools without standards, few goals were found, as well as an efficient and cogent curriculum. The standards served as a skeleton for other content criterion. Similar to McFarland's results (2005), when curriculum was built fusing a standards framework with leveled scaffolded cognitive objectives, higher levels of achievement were found. Teachers implemented curriculum that was designed to meet the standards and the needs of the learners as well (McCaffrey et al., 2001). In

the traditional curriculum program, goals were sporadic, content was not aligned, and lower level learning objectives, as well as gaps were evident.

Vertically and horizontally aligned core curriculum content standards are a base for an efficient curriculum design (English & Steffy, 2001; Tanner & Tanner, 2007). Spielhagen (2006) found that when school districts use standards to streamline curriculum efficiently, teachers do not re-teach concepts several times over, ultimately providing a more direct route toward long-term curriculum goals and increasing student achievement. The author indicated that when an efficiently designed math curriculum was created, students were able to complete concepts at an earlier age. Gaps were eliminated, and the curriculum provided teachers an organized framework on which to focus student needs. Also, when teachers did not repeat content that had already been taught, they were able to cover more concepts associated with the goals and objectives of the program. Curriculum congestion and gaps prevent the seamless progression of content from grade to grade, as well as within grades and negatively influence achievement outcomes (Elmore, 1990; Tanner & Tanner, 2007).

While curriculum content standards can be a basis for curriculum design, the literature suggested that standards are a beginning to curriculum design, not an end. Zhao (2009) found that the narrowing of content toward standards and assessment might lead to lower student achievement toward the goals associated with democratic society. In fact, nations that focused on standardization of content and accountability had the fewest patents and lowest levels of innovation in the world, as compared to nations that focused learning on thinking and domains of the curriculum paradigm. Other researchers describe the implications of using curriculum standards as an end product for learning.

English and Steffy (2001) posed that while standards provide a clear framework to work within, one set of learning knowledge might be detrimental to learning as standardizing learning might stifle learning experience with just one body of knowledge. English and Papa (2009) noted that this is a major flaw in national and local educational policy, and that standards might limit student learning and do not address individual student needs or goals. Dewey's (1902, 1938) research, later refined by Tyler (1949), noted that, "no single source of information is adequate to provide a basis for wise and comprehensive decisions about the objectives of the school" (p.4). In the Eight Year Study (Aiken, 1942), researchers found that when curriculum was not standardized but designed democratically, and the structure balanced the nature of knowledge, while taking into account student needs and experiences, achievement was higher. Therefore, quality curriculum designs may be designs that are not standardized, but where standards serve as a baseline for learning.

Assessment. Assessment is a strategic component of a quality curriculum.

Assessment should be a diagnostic tool for assessing the connection between what is taught and known (Smith & Tyler, 1942; Tyler, 1949, 1975). Schools and school districts that have operationalized this concept have found their levels of student achievement to be higher (Herrington & MacDonald, 2001). Assessments provide meaningful data at multiple levels on how well students are performing given the curriculum and the goals so schools and school leaders can generate ways to improve the curriculum and educational process (Smith & Tyler, 1942). The data outcomes from assessments are most effective when assessment is ongoing and informs educators to make precise

changes to the curriculum to target content deficiencies or student needs (Au, 2007; Hamilton, 2003; Marzano, Waters, & McNulty, 2005; Tanner & Tanner, 2007).

Kim and Sunderman (2005) found that ongoing assessment using multiple measures of achievement provides high-quality data describing a thorough picture of what is really happening in secondary schools. In their study of school-level data from Virginia and California, these researchers found that when data primarily from high-stakes assessments is used to drive learning, decisions based on achievement is likely to be clouded with inaccuracies, especially for students in subgroups. Further, as the Eight Year Study demonstrated, when curriculum design is focused on a reflective process where teachers are part of determining and reviewing the design of the curriculum, achievement tends to be higher (Aiken 1942; Tyler & Smith, 1942). Tanner and Tanner (2007) identified this as the cornerstone of a democratic curriculum.

The use of multiple measures to diagnose student learning promotes a dynamic curriculum. Multiple measures can inform school leaders and teachers of meaningful content that promotes growth in achievement. For instance, a mix of formative assessments can be a productive tool to drive curriculum growth and achievement (Black & Wiliam, 2003; 2005). The National Research Council (2001) found that when classroom benchmark assessments are used more frequently than yearly high-stakes assessments, the data the assessments produce are more reliable and valid indicators of what students are really learning. Researchers also provide several different assessment systems that describe how meaningful assessments systems can drive curriculum and instruction and increase assessment outcomes (Black & Wiliam, 2005; Choi, Goldschmidt, & Yamashiro, 2005; Smithson & Porter, 2004; Wilson & Draney, 2004). If

achievement is to raise, curriculum must entail systems for informing design, and addressing the delivery of the curriculum to target curricular needs toward goals.

High-stakes assessments are an integral part of the current public school context. The impact that high-stakes assessments have on curriculum is important. Research demonstrates that high-stakes assessments establish a sense of urgency to improve student achievement, which can serve as a catalyst to improving or changing the curriculum. Koretz, McCaffrey, and Hamilton (2001) found that when schools face consequences for not performing to standards on high-stakes assessments, school organizations become more motivated to improve. With increased school accountability for achievement, schools have been forced to reflect on their organization, systems of learning content and curriculum. One example of such an opportunity is a curriculum audit. Curriculum audits are generally used as an objective review of the curriculum from a third party (English & Poston, 1999; English & Steffy, 2001).

Roderick and Engel (2001) and Roderick, Jacob, and Bryk (2002) found that accountability, specifically using assessment outcomes in lower socioeconomic contexts, influences variables such as curriculum design focused on increasing student achievement, whereas, without assessment data schools might have postponed curriculum redesign. The data serve as a starting point for schools and organizations to reflect on growth. Wolf, Borko, Elliot, and McIver, (2000) found that when schools and teachers feel more accountable for the state curriculum and assessments, teachers likely become more mindful of what needs to be taught, increasing an increased connection towards curriculum. The researchers also described a transfer of instructional delivery of new curriculum from the teachers' participation in curricular change. Taylor, Shephard,

Kinner, and Rosenthal's (2003) findings magnified this outcome, as data from assessments in mathematics led to changes in curriculum that allegedly promoted higher achievement. Assessments used for accountability appear to have motivated change when otherwise there would have been little need for change.

On the other hand, the literature also identifies adverse effects of high-stakes assessments on the quality of the curriculum and student achievement. Tyack and Cuban (1995) posited that historically, high-stakes assessments have centered on low-ordered thinking skills and tasks. Many schools and school leaders align their curriculum and instruction to the summative assessments, and lower the level of educational processes that occur within the classrooms. Linn (2003, 2005) reported that when schools fail to meet AYP, schools are forced to change curricular goals to improve scores on what is tested, not on what should be taught to the students. While it may be mindful for school leaders to attempt to game assessments or for schools to teach to the test, no empirical evidence suggests that doing so is effective in raising achievement (Firestone, Mayrowetz, & Fairman, 1998; Jones, Jones, Hardon, Chapman, & Davis, 1999).

When increasing high-stakes assessment scores becomes the priority, assessment begins to dictate curriculum. Researchers suggest that this may result in the lowering of curricular quality and deviance from organizational goals (Hamilton, 2003; Linn et al., 2002; Pedulla, Abrams, Madus, Russell, & Miao, 2003). Reed (2005) study clarified this indication in his study investigating the results of assessment based accountability systems in low performing, urban fringe high schools in California. The researcher found when high schools mainly focused their curriculum on high-stakes assessment outputs the effects were linked to quantitative mandates, not educational goals. The result was a

reduction in the number of subjects taught and decreased standards for achievement, most notably at the higher academic levels (emphasis on Mental Discipline). Less content was covered towards comprehensive content standards. Thorndike demolished the theory of Mental Discipline in his landmark study conducted in the 1920s, which was replicated in subsequent studies (Tanner, 1975; Tanner & Tanner, 2007). Although not mentioned in the Reed study (2005), the Eight Year Study (Aiken, 1942) demonstrated that when content was not narrowed, yet served as conduit to achieve educational goals, students were likely to achieve at higher levels. Further, Reed (2005) also found that in spite of curricular changes focused on high-stakes assessments, achievement in the high schools lowered over time.

In a qualitative study of two rural high school classrooms in Mississippi over one year, Lamb (2007) found that when accountability becomes a major factor effecting school culture, curriculum became limited in depth and teachers shifted focus away from the curriculum toward tests. Further, classroom instruction before the assessment changed limiting instruction to preparing for the assessment. Students in these classrooms reported more pressure to perform on the assessments and relied on memorizing content. Tepper (2002) noted that some schools cut up to 20% of their curriculum coverage to transform their schools into test prep factories, and programs and courses are likely to be eliminated to align curriculum strictly to assessments, redirecting efforts away from curricular or educational outputs Hamilton (2003).

In a national study of assessment directors' perceptions of the impact of the No Child Left Behind Act, specifically the assessments required, Pederson (2007) found several curricular impacts occurred, including a reduction of resources allocated to non-

tested subjects and greater alignment to what was tested at the state level. Pedulla and colleagues (2003) suggested that a common effect of reform alignment towards assessment is a shift in funding and materials to support test prep versus curricular goals. Pederson (2007) noted that while in many states attempted to align curriculum systems based on standards and assessment, several state assessment directors noted that virtually no increases in achievement occurred.

Ogawa, Sandholtz, Martinez-Flores, and Scribner (2003) investigated a school district's efforts to develop and implement a standards-based curriculum over time. The school district employed a system-wide reform effort by aligning curriculum and instruction in the district towards recently revised statewide standards and assessments. The researchers concluded that while the approach to effecting change was rational and realistic, similar to other studies (Lamb, 2007; Pederson, 2007; Reed, 2005), curriculum standards in the district yielded lower learning objectives influencing pedagogy, narrowing of curriculum and instructional strategies, and a lack of instructional focus toward district goals, as well as lower achievement.

In fact, school leaders who deemphasize assessment may positively influence achievement. McFarland (2005) found that high school leaders were able to increase student achievement on standardized assessments by de-emphasizing high-stakes assessments and using curriculum revision opportunities to focus on broad, rigorous curriculum goals that were connected to a broad framework for successful democratic participation. Instead of focusing on standardized assessments alone, school leaders focused on using data from benchmark assessments to drive student needs and change curricular goals. School leaders were then able to amend existing curriculum to become

more efficient, scaffold learning goals from grade to grade, and eliminate gaps (using frequent data collection) within curriculum that existed. Assessments are certainly important; yet, when a school community can drive teaching and learning to meet a broad curricular framework, assessment becomes a piece of this mission, not the mission itself.

Curriculum Development

The processes associated with the design of curriculum are important. Quality curriculum resembles a dynamic system, where development is an ongoing, democratic process that supports teaching and learning and achievement (English & Steffy, 2001; Tyler, 1949). Tanner and Tanner (2007) posed that high schools and school districts must continuously develop curriculum to build on a previous work that meets the demands of an ever-changing society, the needs of the children, and the criteria for what students need to learn and do to attain successful outcomes. The system of curriculum development allows school communities to focus on a multitude of different organizational needs, including raising student achievement.

The effectiveness of the curriculum development process was underscored in the findings of the Eight Year Study (1942). In this quasi-experimental study, colleges and universities dropped entrance requirements for students from 30 high schools across the nation. Schools were given the freedom to develop their curriculum in non-traditional ways. School leaders, teachers, parents, and other stakeholders worked toward shared goals by developing systems for curriculum development, as well as the pedagogical and assessment systems that met the components of the curriculum paradigm. Students from the schools participating in the study were matched with students in schools not

participating by age, race, scholastic aptitude scores, vocation and other interest, as well as home and community background. At the end of the study, among several significant findings, the researchers found that students in the participating schools had higher levels of achievement, were more likely to solve problems effectively, and received more academic honors during their 4 years of high school.

The process of curriculum development promotes shared leadership and strategic planning in schools by including teachers and other stakeholders. While school leaders have an indirect effect on student achievement (Hallinger & Heck, 1998), the implications of sharing leadership with teachers who have a direct impact on student learning are significant. Sharing leadership with teachers during curriculum development and implementation allow teachers to contribute to decisions about student learning. Participation helps influence skills associated with pedagogy and the delivery of curriculum (Wallace, 2001). Teachers who serve as leaders in this process build professional learning community that target instructional needs (Wallace & Hall, 1994), job-embedded professional development (Marsick & Watkins, 1990), and group collaboration towards achievement goals (Sergiovanni, 1990; Tyler, 1949; Wallace, 2001). The results of a democratic curriculum development process are important to achievement.

In a cross-sectional study of schools (elementary, middle, high schools) in 189 school districts in Ohio, Kercheval and Newbill (2004) found the process of curriculum alignment and organization to be highly instrumental with respect to improving assessment scores over time. When curriculum development sessions occurred, the process is an opportunity for educators to calibrate aspects of instruction and content

delivery. Results indicated that curriculum alignment fostered professional relationships, increased teacher empowerment, and built teacher capacity to deliver a curriculum that is aligned to what is assessed. When systems of collaboration are established that allow educators to buy into what they teach, success follows (Bolman & Deal, 2003; Elmore, 1990; Jacobs, 2004; Leithwood & Pristine, 2002; Stein & D'Amico, 2002). However, without the collective initiative to deliver the aligned curriculum together, the process may not be productive. Ogawa and colleagues (2003) found that when school districts lack a clear instructional philosophy, the development and implementation of a standards-based curriculum might not be successful because standardized content goals are not necessarily geared to the learners that schools have.

The collaborative process of curriculum development provides a vehicle for stakeholders to identify content gaps within the vertical curriculum design, as well as the horizontal coordination linked to implementation. Jacobs (2004) found that when teachers work together to map curriculum, the result is a high-quality curriculum that is efficiently aligned both vertically and horizontally. In the study, before the development of the district's curriculum project, the Ankeny Community School District in Des Moines, Iowa contained many curricular gaps which provided missing concepts in teaching and learning, resulting in lower student achievement. Teachers taught their favorite concepts within the subject causing inconsistent content at similar grade levels in similar courses, causing poor achievement. To remedy the problem, the school provided professional development sessions to map curriculum based on school goals and objectives. Topics of sessions brought teachers and school leaders together to focus on improving achievement (e.g., data analysis, integrating content across different subjects).

The process brought teachers and leadership together to address content issues in collaborative communities by reducing isolation of topics and concepts. Wilansky (2006) found higher student achievement when schools used a curriculum-mapping model (Jacobs, 2004). The study found that teachers believed curriculum mapping was the genesis for improvement of their instructional program. Although the researcher did not indicate if other processes could also have contributed to the same output, such as coaching or professional development, the research by both Jacobs (2004) and Wilansky (2006) demonstrates that schools that focus their processes for growth on achievement can be successful using curriculum development as their vehicle.

The process of curriculum development also promotes changes in culture and belief systems in schools. In a meta-analysis of 69 schools, Marzano, Waters and McNulty (2005) expanded on teacher collective efficacy research conducted by Goddard, Hoy, and Hoy (2000) by finding that effective schools work together to build communities that have purpose, and the development of this purpose builds belief that goals can be attained. Dreyfuss (2005) found that the process of curriculum development boosted teacher efficacy and a belief that all students can pass statewide assessments, resulting in increased student achievement. The study identified that by building such capacity, members of the organization develop shared goals and a vision for success. Utilizing “envisionment” building strategies (p. 685) allows school leaders and teachers to work together in common activities (Applebee, Langer, Nystrand & Gamoran, 2003).

Educational leadership research also suggests the importance of leadership in the strategic growth of any organization (Bass & Avolio, 1994; Leithwood, 1994). Elmore (2000) suggested that leaders must distribute leadership in the growth process, as areas of

curriculum too broad for most practitioners to master. At the district level, this distribution of leadership provides an avenue for growth of the overall organization. Locally at each school, distributing leadership also provides the school leader the opportunity serves as the change agent for raising achievement. In a qualitative study, Habegger (2007) found that the principal was the critical agent of support when balancing forces of accountability and raising achievement. The researcher found that principals in high performing schools built community capacity among teachers, students, parents, and other communities. Principals set clear directions for both teachers and students.

Empirical evidence also indicates that when schools use canned-curriculum or nominally implement the standards as a curriculum, student achievement might decrease. Langer (2001) found that high schools that resist curricular change to meet the needs of a standards-based environment have lower student proficiency than schools that embrace curricular revision and grow accordingly. In the study, schools were unable to meet the needs of mandates and reforms with a stagnant curriculum that was not embraced by the teacher. Aiken (1942) found that when curriculum is distributed to the teachers, teachers tended to not use the curriculum, but focus on other areas of guidance. Tanner described the use of textbooks as a standardized method of instructional support which many times took the place of curriculum and has a negative impact on achievement (Tanner, 1988; 1999; Wilson, Peterson, Ball & Cohen, 1996).

At the root of the quality curriculum, the curriculum leader serves as an agent of curriculum design and development to make operational a curriculum that works (Tanner & Tanner, 2007). Sergiovanni (2004) indicated that a school leader brings people

together and jockeys for support on all levels toward shared goals. In a case study of a high school in California, the principal worked collaboratively with the math supervisor and teachers to create a clear vision of achievement in the high school, achievement gains occurred in mathematics achievement over a 3-year period (Surdin, 2007). Using assessment design and curriculum calibration processes, stakeholders linked curriculum, assessment, and instructional design to achievement. The process built capacity for teachers to work toward achievement outputs in a focused manner. Marzano et al. (2005) found that leaders who foster support through curriculum design increase school performance.

Quality curriculum is a dynamic system consisting of the total educational program that is focused on goals for achievement and success, and the individual courses that construct the total program. Curriculum designs are dynamic, focus on the learner, fuse content knowledge and experience with connections to authentic context, and embrace the opportunities that social forces provide. The development of the curriculum is an essential part of the curriculum design. Curriculum is living, and the process of curriculum development is the life force to foster achievement growth of the educational program.

Non-Curricular School-Level Variables That May Influence Instruction

High school leaders have the ability to contribute to instructional contexts at the school level that support student achievement (Hallinger & Heck, 1998). For instance,

Brewer (1993) found that school leaders hiring practices had a mediating effect on student achievement. School leaders that had high expectations for achievement increased achievement in their respective high schools. On the contrary, school leaders that had low expectations were not factors in raising achievement. Results from meta-analysis research by Marzano and colleagues (2005) suggested that school leaders in schools with higher achievement support and protect teachers so that instructional effectiveness can be as successful as possible. Leaders are charged with sifting through various of organizational constructs to determine the best strategies for developing instructional effectiveness in their schools (Marzano, Pickering, & Pollock, 2001). To delimit the breadth of these different strategies, the review of proximal non-curricular school-level instructional variables that may influence instruction was centered on variables important to New Jersey as noted in the school report card (NJDOE, 2008d). These areas included manipulating average class sizes, increasing and decreasing instructional time, increasing Highly Qualified Teachers, and quantities of educational technology.

Instructional Time

The commodity of time is a variable resource for teaching and learning. Instructional time allows teachers to deliver curriculum, especially curriculum that is rigorous, and differentiated to the needs of the learners (Bloom, 1984; Marzano, 2007). School leaders have created various schedule designs (e.g., block scheduling) that increase the amount of instructional time, which in theory provides a greater opportunity for teachers to delivery content in various ways. Increasing or protecting instructional

time provides more time for students on task, for student engagement, more time to deliver curriculum topics or engage students in authentic problem solving events, and a more favorable pace so teachers might delve deeper into content (Berliner, 1990; Tobin, 1987) though instructional time itself is not synonymous with instructional time on task

Instructional time provides teachers the opportunity to deliver curriculum that is complex and integrated with other subject areas, which links to achievement levels. In a qualitative study following 50 students over time, Clark and Linn (2003) found that when school leaders cut instructional time, student achievement greatly diminished. Teachers were required to cover vast amounts of content required by state and national standards, especially with lab related activities. These types of activities required more instructional time. When conditions provided adequate time, student achievement increased. Earlier studies conducted at the elementary and middle levels reinforce the notion that instructional time allows an increase of opportunity for the mastery of concepts (Burke, 1983; Slavin, 1987) and student achievement by up to one standard deviation (Bloom, 1984). Instructional time is a scarce resource that is an important condition for learning and regardless of student ability or wealth factor, without adequate time, teachers cannot expose students to content that is necessary for student achievement.

Cox (2007) found that more instructional time benefited socioeconomically disadvantaged students who struggled with reading more than students who were not socioeconomically disadvantaged. Students in high school that are victims of the different effects of socioeconomics and poverty over time may benefit from increased instructional time. The increase in instructional time allows teachers to target skills and needs that other students might not need at the high school level.

Increasing instructional time also may help more advanced students gain more knowledge as well. Crotteau (2002) found that increased instructional time in a non-traditional schedule benefited students with above average ability. By adding class instructional time, students are exposed to non-traditional learning experiences that would not be afforded in a traditional 40-minute classroom schedule. These experiences lead to higher cognition and a deeper understanding of concepts.

In a study of school districts that outperformed NCLB standards in mathematics, Harley (2008) found that high schools focused on a number of different policies for growth. However, the only policy that predicted higher student achievement was block scheduling, where greater instructional time was allocated to teachers. During lessons, teachers implemented practices that enhanced learning in mathematics such as using technology to enhance instruction. Block scheduling provides teachers to time to complete lessons and projects that require more time on task than the traditional time allotted in classrooms.

School leaders may also protect instructional time to increase achievement. Coulter (2009) investigated the allocation of educational resources focused on improving student learning in six California high schools. Using a qualitative analysis of these high schools, schools that were effective toward achievement protected or increased instructional time in the core subject areas. In a study of collective efficacy and instructional leadership, Fancera (2009) found that the protection of instructional time might be associated with student achievement but warranted further study.

Although increasing or protecting instructional time may be important to increasing student achievement, some researchers suggest that instructional time might

not be as important as other characteristics of high schools (Karweit, 1985; Karweit & Slavin, 1982; Levin & Tsang, 1987). For instance, perhaps teacher quality or effectiveness is more important than just having time. Research suggests that efficiency of teaching in a standards-based learning environment can increase student achievement (Marzano, 2007) that would counter the argument for increased instruction. Regardless, some studies previously mentioned suggest that protecting or increasing instructional time is linked to higher achievement and further research is warranted.

Class Size

Class size reduction is a popular strategy for increasing student achievement, especially at the elementary level. Studies including the widely publicized Tennessee Student Teacher Achievement Ratio project (Project STAR) conclude that students in lower grades (K-3) benefit greatly from smaller class sizes (Achilles, 1999; Finn & Achilles, 1999; Nye & Hedges, 2001). However, at the upper grades, the literature is mixed.

Johnson-Dennis (2005) found that smaller class sizes provide teachers the avenue to employ more authentic teaching activities that led to an increase in achievement. The author concluded that smaller class sizes at the high school level allowed teachers to develop teaching skills that promoted quality instruction over quantity of students in the classroom. Teachers with smaller class sizes offered lessons that were more creative, innovative, and open-ended. In addition, teachers appear to have engaged in deeper interactions with the students, and were able to target individual student needs more productively than in larger classes.

The ratio of teacher to student interactions decreases in smaller class sizes.

O'Neil (2004) found that students enrolled in math class, regardless of the level, benefited from interventions offered through direct instruction in smaller groupings in class. Smaller groupings of students provide opportunities for an increased frequency of interactions with children (Bloom, 1984; Slavin, 1990). Nicholas (2004) affirmed previous studies conducted by Rice (1999) and Bryk, Lee and Holland (1993) that larger class sizes appear to suppress student achievement and smaller class sizes were significantly correlated to student achievement scores over time. Similar finding yielded that students were able to interact more with teachers, and more time could be spent with students to address needs in smaller classes. Smaller class sizes, regardless of level allow teachers to focus on the content, process and products of instruction more easily (Tomlinson, 2001).

Though some studies on this topic are promising, other studies fail to confirm a relationship between smaller class size and student achievement at the high school level. Wyss, Tai, and Sadler (2007), for example, found no significant difference for student achievement for high school students in science until class sizes fell below ten students. This supported earlier work such as Project STAR, which indicates that few effects are shown for class size reduction in grades above third (Finn & Achilles, 1999). Regardless, size certainly poses a meaningful opportunity for teachers to increase teacher to pupil interactions, a consistent proxy for improvement in both areas of work.

Highly Qualified Teacher/Teacher Certification

Darling-Hammond (2000) described certification or a teacher's status of license as "a measure of teacher qualifications that combines aspects of knowledge about subject matter and about teaching and learning" (pp. 7-8). Under the No Child Left Behind Act, all high school teachers in all classrooms must be *highly qualified* in their state. In the State of New Jersey, high school teachers must be certified in their content area (grades 9-12) in order to be considered highly qualified. A teacher's content attainment and certification are strong predictors of student achievement (Darling-Hammond, 2000; Hawley-Miles, & Darling-Hammond, 1998). Teachers who have the appropriate content background can deliver meaningful instruction to the students. White's findings (2007) affirm this notion. White found a statistically significant difference in the achievement level of students when taught by highly qualified teacher versus a non-highly qualified teacher. Sparks (2004) found similar results. Surprisingly, the correlates of highly qualified teacher status were more pronounced at the elementary level compared with the high school level. Regardless, students that are taught by teachers who are highly-qualified should perform better than teachers who are not highly qualified.

Cain (2009) investigated the relationships between various school-level variables and reading and mathematics achievement in Alabama high schools. Using a Pearson Product Moment Correlation, the researcher found that schools with higher percentages of highly qualified teachers had stronger achievement. The results also indicated that the results indicated that achievement gaps were decreased between general and special education students in schools with a higher percentage of highly qualified teachers.

Highly qualified teachers that have deep content knowledge are able to provide strong technical content within instruction. In a study of 438 teachers in California, Hill and Theule-Lubienski (2007) found that many lower socioeconomic schools do not have the same number of teachers as schools that are more affluent. Findings indicated that the implications were lower student achievement for students in lower socioeconomic areas. Instructional leaders in schools who have worked to raise teacher content knowledge have been linked to higher achievement (Stein & D'Amico, 2002).

Regardless, some observers remained skeptical about the designation of a teacher as highly qualified. For instance, Craig (2006) found that improving student achievement in Florida may require more than just adding highly qualified teachers as defined by NCLB. Sullivan (2005) found no significant relationships between teacher quality characteristics (HQ) and mathematics achievement. Ringrose (2004) found no significant difference between certified and non-certified teachers and student achievement on the End of Course Algebra I assessment in a Texas suburban school district. These studies posit that just having highly qualified teachers in classrooms may not be enough to promote higher student achievement. Recommendations in these studies include massive professional development and other developmental tools to be coupled with highly-qualified teachers in order for student achievement to occur.

The goal of having highly-qualified teachers in the classroom is that these teachers will be equipped and able to deliver the instruction needed for students to be successful. While the research conflicts on whether students will perform better if students are taught by teachers that are “highly-qualified,” the premise seems simple: better teachers’ equal better education.

Educational Technology

Computer availability and access have increased in recent years (Valadez & Duran, 2007). Whether the use is at home or in school, the accessibility of educational technology is a growing integral characteristic of schools. In fact, the 2010 National Educational Technology Plan (NETP) recommends a host of computer and non-computer apparatus that provide students the ability conduct research, communicate, use multimedia tools and content creation, and collaborate in and out of school (USDOE, 2010). Therefore, the availability of technology is important to the requirements of public schools and public education, as having technology seems an integral part of schooling and toward increased achievement.

Latio (2009) found that teachers who have adequate technology (numbers and functionality) are more likely to use computers in classroom learning. Teachers in Ohio public schools felt that increasing the number of computers in classrooms reduced barriers toward student learning. This was especially significant in schools where technology was located in classrooms, versus computer labs. Teachers in classrooms with increased technology employed learning situations that entailed access to much more information than in classrooms without the technology available or learning.

In a longitudinal study using a national sample of 8,283 students, Judge, Puckett, and Bell (2006) found that students who had access to technology, as well as a higher frequency with using the Internet had higher student achievement. Access to technology and other resources provided students with greater accessibility to information used to solve problems and aide in learning. The same study also suggested that schools

concentrate computers in computer labs, although students' computer usage may be greater when students have computers accessible in their classrooms rather than located in relatively distant computer labs.

Access to technology also provides different assistive opportunities for students. Lowther, Inan, Strahl, and Ross (2008) found a relationship between technologies that assisted students, specifically those with special needs and student achievement. In the study, different tools associated with technology access (word processing, presentation, concept mapping, and Internet) were found to contribute to learning situations that enhanced traditional learning. Classrooms without technology may not provide the same opportunities for learning. Computers in classrooms, for example, allow students to immediately integrate text into speech, or allow words to be deciphered, whereas textbooks could never facilitate this need. This study indicated that having computer applications available to support students with special needs could be advantageous for all learners.

Although simply adding computers or providing more computers in classrooms per student seems linked to higher student achievement, the literature also suggest that other factors associated with having technology may or may not contribute to higher assessment scores. For instance, Valadez and Duran (2007) found that while teacher access to technology was important, the determining factor to improving achievement was how teachers accessed curriculum. Judge and colleagues (2006) determined that frequent use of software for rote learning of basic skills negatively related to reading achievement. Students who used technology as a tool instead had greater access to resources for problem solving. Zhao (2009) claimed that the availability of technology

provides global access to information and resources the *death of distance*. Albeit other factors may be present that serve as mediating agents for technology and learning, the research indicating that having more technology available or increasing the number of computers per student correlates to higher achievement scores merits research and possible implications for high school leaders.

Facility Quality

A growing body of literature suggests that the quality of the educational facility may influence student achievement at the high school level. Synthesis of the literature informed the researcher that facility quality and achievement are connected. However, attributes such as the learning environment might influence achievement different from security. Therefore, the literature were organized and reviewed into four categories: physical environment, learning environment, technology and safety and security. Previous studies have not distributed attributes in these categories.

Physical Environment

The physical environment, consisting of the structure of the school (e.g., condition, size, interior condition, external condition, aesthetics) may influence student learning. Seminal studies conducted by Weinstein (1979) and McGuffey (1982) reviewed hundreds of investigations focused on the relationship between the physical building and achievement in schools. Weinstein concentrated most of her work on 1970s open-school environments, and McGuffey on more traditional elementary and secondary environments. These researchers reviewed results for various attributes of schools, such

as building age, temperature, visuals, paint and interior coloring, acoustics, space, windows, size, building efficiency and utilization, support facilities, special instructional areas, and enrollment sizes. Both researchers noted that while some studies showed promise, few studies had reached refutable conclusions. More recent reviews were conducted by Earthman and Lemasters (1996, October, 1997) and Earthman, Cash, and Van Berkum (1995). These studies reported similar findings suggesting that the results were inconclusive and warranted further study.

Picus, Marion, Calvo, and Glenn (2005) investigated the connection between facilities and student achievement. They observed that two methodological issues were consistently found in previous studies such as Earthman and Lemasters (1996; 1997) and Earthman, Cash, and Van Berkum (1995). First, Picus and colleagues described the difficulty in objectively measuring variables associated with the facility. For instance, measurement of attributes such as building condition are difficult because other variables influence the condition of a facility such as janitorial care, retrofitting, and geographical region, and contribute to the condition differently.

The second methodological issue found in previous studies was the availability of high-quality data. Picus and colleagues (2005) determined that most states do not collect data on the facility that might have any relationship to student achievement. The data that is needed is rarely available for studies; especially those that are large scale or require multivariate analyses (p.74). Few states have complete databases on school facilities, such as Wyoming. New Jersey is a typical state that does not keep a database on school facilities. While some school districts such as the New Jersey *Abbott* districts are required to report more data on facilities, most schools do not submit yearly reports

that document the state of the schools with regards to age, HVAC condition or existence, capacity (space or enrollment), or condition of the school. In the early 2000s, Wyoming became the first state in the nation to establish a statewide database that aims on collecting facility information on every school in the state (Picus et al., 2005). In the Wyoming Facility Condition Index Report, a yearly reporting system, each school completes a battery of questions on each section of the school including indoor air quality, kitchen condition, space, and age of faculty, from which an index is reported on how adequate each component of the school is.

Therefore, improving from the methodological issues found in previous studies, Picus and colleagues (2005) used a multivariate correlational method to determine whether a relationship existed between numerous facility attributes and student achievement. The researchers found virtually no relationship between building condition ($R^2 = 0.0$, ns), building suitability and student achievement. When controlling for SES, findings also suggested a minimal relationship ($R^2 = 0.0$, ns).

Other studies indicate that the condition of the physical facility is positively associated with higher student achievement. Blincoe (2008) investigated the relationship between the age and condition of Texas high schools and student achievement. In the study, the researcher found a significant correlation between schools in excellent condition, and mathematics, science and language arts literacy scores. The researcher also found the age of the school building was also related to student achievement. The age of the school building, as well as the learning conditions of the school influence the way teachers teach and students learn.

The quality of the facility may influence teacher attrition, especially in urban and disadvantaged areas. Buckley, Schneider, and Shang (2005) investigated the importance of the facility toward teachers' decision to leave positions in Washington D.C. schools. Using survey data, the researchers found that facility quality, termed facility grade, was a significant predictor toward teachers exiting their positions. The researchers concluded that investing in the facility which could be a one time cost may be less expensive in the long run versus replacing teachers frequently, which requires various needs including continuous professional development. In a smaller study, Earthman and Lemasters (2009) echoed the findings of Buckley et al. (2005). The researchers concluded through survey data that the condition of the classroom negatively effects teacher morale, which produces negative attitudes about instruction, and continuing teaching. Teacher perceptions regarding the classroom condition also contributed to teacher attrition.

O'Sullivan (2006) found that any improvement in a school building's condition, either cosmetic or structural, was associated with an increase in student achievement, based on a composite index of scores on the facility and three-years of student assessment data. The researcher found that regardless of the type of facility improvement such as a new paint job or new lighting fixtures, student achievement improved as these conditions improved. The O'Sullivan study (2006) partially replicated previous work conducted by Al-Enezi (2002) in Kuwait. Al-Enezi found similar results. As structural and cosmetic conditions in high schools improved, student achievement for high school students improved significantly. Graffiti and roof leaks were the main predictors of physical attributes that affected student learning. Schools that appeared to be run down and have cosmetic and structural defects appear to influence student achievement negatively.

In a case study of an urban high school Edwards (2006) investigated the relationship between school facility conditions and student achievement. The researcher found a significant connection between the condition of the school students attended and their own levels of motivation, conduct, and achievement. In the study, 25 high school students identified that the better the school conditions, the stronger was a perception that the school had a higher-quality cohort of teachers and administrators employed in that school. Students also attributed a distinct connection between students' perceptions of the facilities in which they are educated and the degree to which the school district values the students' education and safety. School facilities that were well maintained were perceived by students as safer, better schools. The findings also suggested that students in these schools felt cared about, safer, and part of an environment where individuals might be successful.

Crook (2006) also found a significant relationship between building conditions and the percentages of students passing English writing and reading Standards of Learning (SOL) examination in Virginia high schools, using both longitudinal SOL data and data from the Commonwealth of Virginia Assessment of Physical Environment (CAPE). In an earlier study conducted in Indiana, Syverson (2005) found a significant relationship between building condition and student achievement. Syverson used a Spearman Correlation Coefficient to compare survey data from principals in 50 high schools and student achievement scores on the Indiana Statewide Test for Educational Progress. Whereas previous studies lacked essential data on the facility or assessment, these more recent studies drew from newer data sources, which may have yielded better results. Both researchers found that substandard building conditions influenced

achievement negatively, and better conditions appear to have supported higher levels of student achievement.

Learning Environment

The learning environment is another facility attribute that may be important to high school achievement. Learning environments include lab areas, classrooms geared toward student needs, other workspaces, lighting, and acoustics. Though previous studies tend to couple the physical environment and the learning environment, learning environments can be distinguished from other features of the physical environment as relatively proximal to the experiences of teaching and learning.

Learning environments that enhance instruction may enhance both teacher and student efficacy. In comparative study of four schools in Maine and Virginia, two award winning 21st century architectural designs and two traditional designs in similar socioeconomic areas, the award winning new structures posted higher achievement on standardized assessments and fewer dropouts compared with the traditional designs (Keller, 2007). In these schools, faculty had positive feelings toward their ability to deliver instruction, while in the comparison schools, personnel felt negatively toward the school facility, and mentioned that it may have impeded their enthusiasm and their pedagogy.

While older studies may have been flawed (Picus et al., 2005) and inconclusive (McGuffey, 1982; Weinstein, 1979), recent work during the last 15 or 20 years has begun to provide a better understanding of the influence of the building on student achievement. Hughes (2006) found that school facility design variables such as appropriate classroom

designs and arrangements, color, lighting, and movement patterns were predictors of higher student on the Texas Assessment of Knowledge and Skills. The majority of the variables were associated with the learning environment. The researcher found that regardless of the attribute of the learning environment, when the facility was designed with learning as a focus, higher student achievement resulted. The implications are important as school leaders may choose to focus on the learning environment as a method for increasing achievement instead of the physical environment.

The temperature and air quality of the learning environment may matter toward student achievement. Wyon's (1991) investigation suggested that temperature changes influence student performance on mental tasks. At certain times of the year, temperatures may impede instruction or the ability to deliver instruction in certain ways. For instance, in warm weather classrooms might be so warm that students are uncomfortable and disengage from learning. Air quality, as well as ventilation effects performance as well. Studies indicate that the lack of quality air is unsuitable for students, leading to higher absenteeism and lower achievement, especially with students who have asthma (Strickland, 2001).

Classroom lighting is positively associated with student achievement. Phillips (1997) investigated characteristics of facility quality and found that lighting among other variables was significantly related to student achievement. Lighting in the learning environment is important as lighting contributes to students' visual needs and can influence a student's mental attitude and ability to be successful (Dunn, Krinsky, Murray, & Quinn, 1985). Studies of classroom lighting and achievement conclude that lighting is an essential part of the learning environment (Jago & Tanner, 1999). Well-

lighted learning areas may enhance aesthetics, student vision and comfort, and thus may contribute to student achievement in multiple ways.

Earthman and Lemasters (1996; 1997) reviewed multiple studies, and found consistencies in the findings on acoustics. Good acoustics may be fundamental attributes of high-quality learning environments. The researchers noted, for example, that higher achievement is related to less outside noise. Other studies indicate that noise impedes achievement in areas such as reading and communication (Nabelek & Nabelek, 1994), with students who are hearing impaired (Evans & Maxwell, 1999), and among those with higher stress levels (Lackney, 1999).

Technology

Technology has become an important characteristic of the educational facility as related to student achievement (Valadez & Duran, 2007). Research suggests the number of computers in a school and the number of computers per student was associated with higher student achievement, specifically in expanding access to relevant information (Judge et al., 2006; Latio, 2009), and providing targeted assistive support for students with special needs (Lowther et al., 2008). Technology as a characteristic of facility quality also focuses on specific opportunities within the learning environment.

Technology, especially multimedia learning environments provide teachers another dimension for presenting concepts to students (Liu, 2003). These additional vehicles for presenting information include animation and hypermedia that support cognitive skill acquisition (p. 24). Concerning the integration of technology in schools, Noeth and Volkov (2004) found: (a) when combined with traditional instruction, the use

of computers can increase student learning in the traditional curriculum and basic skills area; (b) the integration of computers with traditional instruction produces higher academic achievement in a variety of subject areas than does traditional instruction alone; (c) students learn more quickly and with greater retention when learning with the aid of computers; (d) students like learning with computers and their attitudes toward learning and school are positively affected by computer use; (e) the use of computers appears most promising for low achieving and at-risk students; and (f) effective and adequate teacher training is an integral element of successful learning programs based or assisted by technology.

In an experimental study comparing traditional reading instruction and computer-assisted instruction (CAI), Dunn (2002) found that the experimental (CAI) group outperformed the traditional group on the standardized assessments given at the end of the study. Students who used computer-assisted instruction had higher reading comprehension scores than the students who were did not have computer-assisted instruction. Neurath and Stephens (2006) found that using Microsoft Excel improved feelings toward taking Algebra and increased achievement was found when students used Excel in the course. Further, students in the study reported that with Excel as a tool for learning, students were able to utilize techniques in a more efficient manner than students who did not have the use of Excel. The use of technology seems to influence student learning and achievement by improving the learning process and influencing cognitive skill acquisition. Classrooms are developed with the use of technology that will influence learning.

Two recent empirical studies in the literature contradict the positive studies indicating the link between the integration of technology in the classroom and student achievement. First, Ngo (2006) found no significant difference between traditional instruction and computer-assisted instruction in a study of two units in an Orange County, California high school of the arts in California. The researcher indicated that when instruction is adequately delivered in the classroom, whether a traditional or non-traditional (CAI) form of pedagogy exists, increases in student achievement still occur. Hence, in the study, students learned chemistry concepts regardless of the technology used in the classroom. Findings from the second study conducted by Kaffer (2006) indicated similar results. Even though PowerPoint and other technology multimedia were used to deliver instruction, no significant interactions or main effects related to student achievement were found. Further, students with disabilities did not increase student achievement with the infusion of technological methods such as an online writing program.

High quality educational facilities include different facets of technology such as computers and Internet capable devices. Learning environments contain broadband connections that target the use of the Internet as a tool for learning. The implications of including technology as an attribute of learning environments toward student achievement are valuable and consider further review.

Security and Safety

Safe schools are important to student learning (Cornell & Mayer, 2010; Elliot, Hamburg, & Williams, 1998) and commonly, school facilities attempt to manage safety

through the physical environment of the school (Mayer & Leone, 2007; Samples & Aber, 1998). Schneider (2010) described various school safety and security components that might be included in the facility. The components included devices such as modern communication apparatus and mechanisms for entering and exiting schools using biometric technologies. In a coordinated effort with the United States Department of Education, the National Institute of Building Sciences (National Clearinghouse for Educational Facilities, n.d.) suggests nearly 400 key components for ensuring that facilities are safe designs. Few empirical studies have found that any strategies that mitigate indiscipline through the facility design are successful, but with the prevalence of such apparatus, mention is warranted.

Bishop (2009) conducted a case study investigating the impact of designs of three new high school facilities (versus their old buildings) on student achievement, staff attitudes and behaviors in Virginia. The researcher found that the physical safety and security features in new buildings led to an increased sense of safety, which influenced student learning. For instance, in building 1, staff felt that many of the safety concerns in the old school were eradicated by the new security systems (surveillance cameras, ID card reader pads) of the new school. While teachers responded that the students who had poor behavior in the old school were still issues in the new school, the security features, hallway designs, new locker room layouts, and the spread out design of the new building made it easier to identify potential hot spots or find discipline areas. Edwards (2006) found that facility design contributed to the student's overall feeling of safety in newer facilities, which may lead to increased student success.

Collins (2006) found that facilities that aim to control movement through design is related to fewer discipline issues. Findings from this study also suggested that schools that have one single entry point for the public as schools can easily monitor the door and ensure that no outsiders enter the building. The researcher also found that hallways designs, metal detectors, and closed-circuit digital monitors allowed schools the ability to monitor behavior more closely.

In a study conducted in a New York City High School, Ginsberg and Loffredo (1993) found that students that attended schools with metal detectors were half as likely to carry weapons such as guns and knives to school. Metal detectors were deterrents of students bringing guns to school and influenced greater safety as reported by the students. In an earlier study of students of New York City High Schools ($n=16$), metal detectors increased safety by reducing the number of weapons being brought into schools (Northrup & Hamrick, 1991).

Although these studies suggest that attempting to control school safety through facility design may lead to decreases in misbehavior, other researchers have found that physical management of the facility does not positively impact school safety (Borum, Cornell, Modzeleski, & Jimerson, 2010; Mayer & Leone, 2007; Wilson-Brewer & Spivak, 1994). Research on the school facility as a means of limiting school violence is mixed. Further, little research has examined the connection between security and safety as a function of the facility and student achievement.

School Safety

Improving a high school's safety climate may be another way to improve student achievement. Many school leaders at the high school level do not focus on improving school safety as a vehicle for improving student achievement (Carr, 2006). Instead, school leaders commonly emphasize areas such as changing instruction or improving classroom practices (Stein & D'Amico, 2002; Wang et al., 1993). A growing body of research suggests that school safety does matter toward how students perform (Cornell & Mayer, 2010; Elliot, Hamburg & Williams, 1998) in areas such as student behavior, school climate, and adolescent health are linked to student achievement.

Incidents of disorder in high schools detract from teaching and learning. Way (2003) found that students in disorderly high schools tend to have lower student achievement. Using the NELS 1988 data set, the author identified that frequent distractions and oppositional attitudes toward authority [defiance] disrupt the teaching and learning process leading to lower scores on standardized assessments. Gottfredson and colleagues (2000) found 27% of teachers reported that student behavior interrupted or deterred instruction. Learning environments need an academic structure that allow the teachers the ability to teach the students in a productive manner (Hawkins, Smith, Hill, Kosterman, Catalano, & Abbott, 2003; Marzano, 2007).

Peer exclusion and victimization negatively impact classroom engagement and achievement. In a longitudinal study, Buhs, Ladd and Herald (2006) found that peer rejection was associated with student disengagement in the classroom and school avoidance. The researchers' findings demonstrated how peer exclusion and victimization could lead to negative behaviors in school and lower student achievement over time.

Additional research was warranted by Buhs et al. (2006) to greater understand the connection of their findings and student achievement.

Family and community violence also may lead to lower school safety. Thompson and Massat (2005) found that the level of exposure to family violence was significantly related to levels of behavior problems and negatively related to school achievement. Especially in urban areas, the authors affirmed previous studies by finding that when students are exposed to violence, specifically family violence, students bring the effects to school causing various barriers to student learning. Previously, Margolin and Gordis' (2000) review of empirical research on the link between children's exposure to violence at home and in the community suggested that students bring violence into the school, which negatively impacts student achievement. The researchers indicated that exposure leads to student aggression and indiscipline, depression, anxiety, as well as brain and human systems development.

Some researchers suggest that schools are safe havens for students with positive climates that promote learning (Elliot et al., 1998). Ripski and Gregory (2009) found some dimensions of school climate, that is unfairness, hostility, and victimization predicted engagement and achievement at different levels of school ecology. Thompson and Massat's (2005) findings indicated that schools provide safe climates for students to learn enhance academic environments for students by reversing the negative effects of family and community violence (Thompson & Massat, 2005). Positive climates may lead to higher student achievement because they support students' social and academic needs (Marzano, 2007). However, a study conducted by Marcoulides, Heck and Papanastasiou (2005) did not support the relationship between climate and achievement. The

researchers study using TIMSS data from 1026 secondary students found no indication (.00) that the climate, or what students perceived to be the climate (safety, attendance, behavior) had any impact on achievement.

Research on peer harassment and bullying also indicates a negative influence on achievement. Although some studies indicate that bullying and harassment more prevalent at the middle level, bullying and harassment are also inherent at the high school level (Dinkes, Cataldi, & Lin-Kelly, 2007; Dinkes, Kemp, & Baum, 2009; Nansel, Overpeck, Pilla, Ruan, Simons-Morton, & Scheidt, 2001). Nansel and colleagues (2001) found that bullied students demonstrated social isolation and increases in problem behaviors. When kids are bullied or harassed, some students do not want to go to school or even dropout. In an exploratory study of nearly 5,000 students, Eisenberg, Neumark-Sztainer and Perry (2003) found that high school students who are bullied skip school, or choose to leave school altogether. This victimization may lead to lower achievement by students (Ripski & Gregory, 2009). Brockenborough and colleagues (2002) found that students who were victimized by other students were more aggressive toward other students and attained lower academic grades. Students were easily influenced to bring guns to school for protection or aggression, engage in physical fights, and used alcohol. The effects of students feeling emotionally safe and free from the aggression of other students allow students in class to recognize mistakes and take risks (Lee, Smith, Petty & Smylie, 1999).

Research suggests that safety is important to achievement and efforts to promote school safety are growing (Cornell & Mayer, 2010). For instance, Gottfredson et al. (2000) and Tolan and Guerra (1994) described hundreds of different approaches from

their investigations that schools utilize in attempting to eradicate student violence in schools. For instance, some studies describe the academic successes of promoting school safety through programs and interventions that are positive for children (Swearer, Peugh, Siebecker, Espelage, Kingsbury & Bevins, 2006; Swearer, Espelage, Vaillancourt & Hymel, 2010). Other research has suggests that some efforts to increase school safety may not be positive for schools and students (Mayer & Leone, 1999; Skiba, 2000). And many described strategies for promoting safe schools are plagued by various methodological issues or not (Cornell & Mayer, 2010; Furlong & Sharkey, 2006; Mayer, 2006). Further research is necessary to better inform research and practice to promote school safety toward raising achievement.

Summary

One hundred percent proficiency is federally mandated for all high schools by 2014. Trajectories indicate that lower socioeconomic New Jersey high schools are at a critical point toward making AYP and approaches for increasing student achievement are needed. Wang and colleagues (1993) suggested that proximal variables should be considered when developing models toward increasing student success. The review of the literature suggested four proximal variables that might influence student achievement: curriculum quality, non-curricular school-level instructional variables, facility quality, and school safety. These four independent variables were operationalized using multiple regression analysis as described in Chapter III.

Hypotheses

Hypothesis 1

Curriculum quality is related to high-school student achievement and plays an important role in schools. Teachers use curriculum to guide them in what content students are presented in lessons. Drawing from current empirical literature, two specific areas of curriculum appear to impact student learning at the high school level. First, when school leaders align curriculum to both state content standards and also statewide criterion-referenced assessments, student achievement on that measures is influenced. Second, the process of curriculum development is also related to student achievement. When schools use collaboration and professional development to revise and design curriculum, school communities come together to create curriculum that sets visions, objectives, and establishes the methods of attaining academic goals. Therefore, high schools that utilize curriculum as a method of improving student achievement will be more successful.

H1_o. High schools in lower socioeconomic communities that employ curriculum of high quality will have no significant achievement advantages on the New Jersey High School Proficiency Assessment in mathematics and Language Arts Literacy.

H1_a: High schools in lower socioeconomic communities that employ curriculum of high quality will have a statistically significant achievement advantages on student achievement as measured by the New Jersey High School Proficiency Assessment in mathematics and Language Arts Literacy.

Hypothesis 2

Instructional quality is related to high-school student achievement. Teacher instruction has a dynamic effect on student learning. School leaders have the ability to impact this effect by their organizational influence over non-curricular school-level variables that influence instruction. Drawing on current empirical literature, school-level variables such as a school's timing allocations, schedule, and teacher-quality may impact student learning in a positive manner. School leaders can implement changes that easily foster researched-based solutions, which affect achievement in positive ways. Hence, school-level variables in New Jersey high schools will have a significant impact on student achievement.

H2₀: School-level variables identified in the New Jersey School Report Card for New Jersey high schools of lower socioeconomic status are unrelated to student achievement on the New Jersey High School Proficiency Assessment in mathematics and Language Arts Literacy.

H2_a: School-level variables identified in the New Jersey School Report Card for New Jersey high schools of lower socioeconomic status are related to student achievement as measured by the New Jersey High School Proficiency Assessment in mathematics and Language Arts Literacy.

Hypothesis 3

The physical plant or quality of facilities is related to student achievement. Some people may under-appreciate the role facilities in a productive learning environment. Drawing from current empirical literature, the quality of the facility may impact student learning. New Jersey high school students may academically benefit from a well-designed school or a school in superior condition. The New Jersey School Development Authority (SDA) reported on its website that since 1998, 10 billion dollars have been allocated to construction projects in schools (new and retrofit work). Use of these funds to provide schools that are clean, in good condition, and provide the educational environmental infrastructure for good teaching to occur, will influence achievement in a positive manner. Therefore, a facility's quality will have a significant impact on student achievement in New Jersey High Schools

H3₀: High schools of lower socioeconomic status that have high quality facilities will display no achievement advantage not have a significant influence on student achievement on the New Jersey High School Proficiency Assessment in mathematics and Language Arts Literacy.

H3_a: High schools of lower socioeconomic status that have high quality facilities will display an advantage in student achievement as measured by the New Jersey High School Proficiency Assessment in mathematics and Language Arts Literacy.

Hypothesis 4

School safety is related to student achievement, Teaching and learning cannot occur efficiently in a climate of fear and apprehension with regard to safety. Drawing from current empirical research, safe high school climates have a positive relationship with student learning. Classroom misbehavior, bullying, drug use, and fighting have a significant negative effect on student learning. Reducing such incidents by way of various angles such as school violence prevention curriculum and therapy will promote orderly learning environments where students can feel safe to learn and take educational risks toward success. Henceforward, high schools that have a safe school climate will have a positive relationship with student achievement.

H3_o: High schools in lower socioeconomic communities that are safer will not outperform others in New Jersey High School Proficiency Assessment in mathematics and Language Arts Literacy.

H3_a: High schools in lower socioeconomic communities that are safer will consistently outperform others in student achievement as measured by the New Jersey High School Proficiency Assessment in mathematics and Language Arts Literacy.

CHAPTER III

METHODOLOGY

Research Design

The researcher utilized a correlation design to investigate the proposed research questions and hypotheses. Correlation research explores the relationships between two or more variables (Gall, Gall, & Borg, 2003). The quality of a correlation design depends on the depth and rationale of the constructs that guide the research design. Herein, the researcher sought to identify statistically significant ($p < .05$) relationships between four independent variables, grounded in previous research and student achievement in lower income high schools. The four independent variables were curriculum quality, non-curricular school-level variables that influence instruction, facility quality, and school safety. A fifth investigation proposed was employed principal components analysis to describe possible combinations that might inform future research.

Multiple Regression Analysis

To investigate relationships within the data for the first four research questions and hypotheses, the researcher employed multiple regression analysis. This method offered several advantages. One advantage is that correlation research is a widely used and sound method for analysis of variables' relationships in non-experimental situations (Cohen, Cohen, West, & Aiken, 2003; Green, Camilli, & Elmore, 2006; Keith, 2006).

Further, multiple regression was appropriate as the non-experimental design (correlation) did not use random assignment of subjects. Instead, the researcher conducted a census of all 117 lower socioeconomic high schools in New Jersey.

The use of multiple regression analysis also provides researchers the methodological ability to find many linear and non-linear relationships at once to parse the variation in levels of the dependent variable (Keith, 2006). Each of these different variables may have large data sets associated with each measure of the variable. In the current study, specific concepts were nested within each construct. For instance, there were four different subsets of data underlying the variable facility quality. Overall, each multiple regression analyses in this study utilized multiple data sets with multiple measures for each variable.

There are also some disadvantages of using multiple regression analysis. One important disadvantage of using correlation designs is that these methods do not find cause. Instead, correlation approaches through analyses using multiple regression analysis allow researchers to only make inferences about general associations based on limited samples. Experimental designs are more powerful because they seek cause and effect. Correlations seek mere associations between variables. However, correlation designs are important in non-experimental work because they allow researchers the opportunity to study several variables that might cause a specific result. Such relationships serve as a first step possibly leading to a later experimental design. The intent of this study was not to determine cause, but to make inferences from the relationships found between the dependent variables and the independent variable.

Using correlation designs also allows the chance that some other variable or variables not included in the study might influence results. This is a disadvantage of the design, as spurious correlations might occur when a lurking variable or variables not associated with variables included in the study are evident (Gall, Gall & Borg, 2003). For instance, researchers might study how time spent on homework is or is not related to student achievement. It might be determined that there is a statistically significant relationship between the variables and that it could be inferred that if students spend more time on their homework, their achievement scores will increase. To prevent this weakness, the method of the study must carefully consider all constructs in the design and try to limit any lurking variable that might account for some of the variability in the results.

Exploratory Factor Analysis

Notwithstanding the main purpose of this study, which was to find correlations between several independent proximal variables and student achievement in New Jersey high schools, an important second step was to investigate a model for further research by reducing several variables to a few variables that might be associated with one another. Because this was a second step in analysis, post-hoc principal components analysis was developed from the significant predictors of achievement found in the four regressions. Post-hoc principal components analysis was selected because its use is generally to extract common components from a data set containing relationships within a large combination of variables associated to one another with large sample sizes (Leech,

Barrett, & Morgan, 2008). Other forms of data reduction, such as principal axis analysis are generally used to find factors or to identify underlying latent variables.

When using PCA to reduce data, several issues were taken into account to defend against possible inaccuracies within the results. One issue is that data reduction is as strong as the data within the dataset. Self-reported data tend to weaker than observed data. Once the data are entered into PCA, the data are then standardized, providing variance between 0 and 1, and yielding no measurement error (Dunteman, 1989). Therefore, researchers should use caution when conducting PCA as data may produce weaker results.

Principal components analysis requires a large sample size. Although the minimum number of cases is argued, Comrey and Lee (1992) suggest that the researcher have 200 or more observation for the varimax rotation to be stable. This study has multiple variables but only 71 cases in the study. This was a limitation and was discussed as a possible issue to the minimum coefficient in the Kaiser-Meyer-Olkin measure of sampling adequacy.

Similar to regression analysis, the goal of PCA is not to determine cause. Principal components analysis is an advanced method for describing relationships between multiple variables and subsets within variables but not producing cause is a weakness of this analytical method. Overall, the strength of using PCA is finding complex relationships and reducing the number of variables to generate theory for future research, such as principal axis analysis, structural equation modeling or confirmatory factor analysis (Henson & Roberts, 2006, 2008).

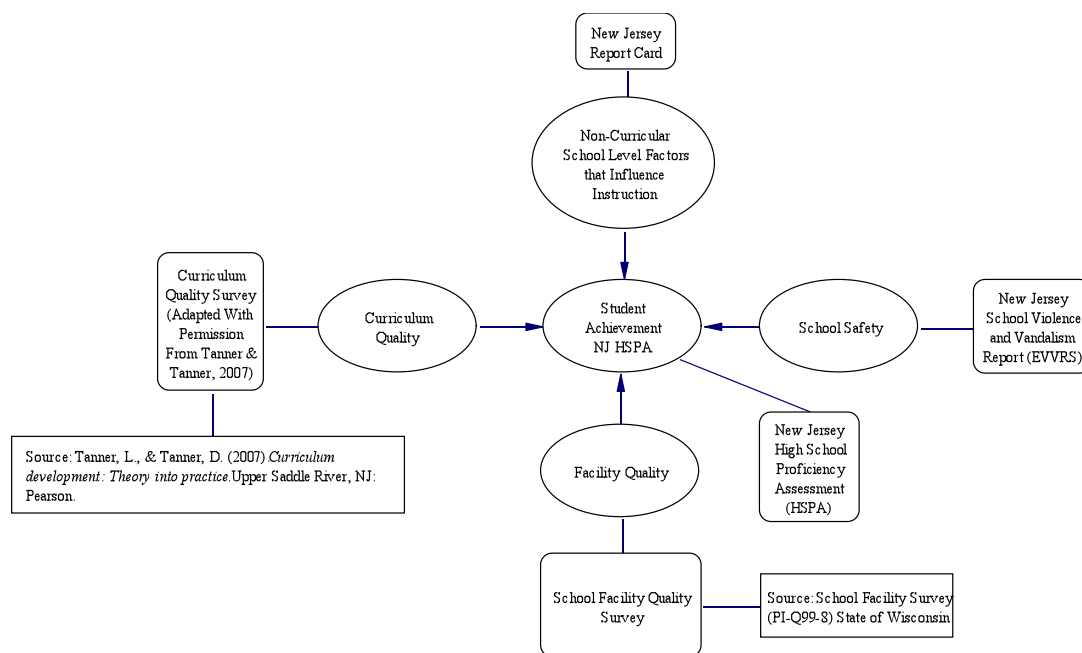


Figure 3. Methodological framework

Unit of Analysis

The unit of analysis is the entity of statistical analysis that is presented (Gall et al., 2003). Several of the variables associated with this study could be analyzed at multiple levels. For instance, among other levels, student achievement can be investigated at the state, district, school, and student levels. Because of the data available, other variables such as non-curricular instructional variables were not available for analysis at specific levels. To focus attention at the lowest level common to all variables, the researcher created a matrix for analysis. Table 1 shows the commonality of the data sets available for this research. As the table suggests, grade and classroom level data on these variables are generally unavailable for secondary schools.

Table 1

Data Availability Matrix (unit of analysis)

Variable*	National	State	District	School	Grade	Classroom	Student
Curriculum Quality		X	X	X	X		
School-Level Variables Influencing Instruction				X			
Facility Quality				X			
School Safety	X	X	X	X	X	X	
Student Achievement (HSPA)	X	X	X	X	X	X	X

*Secondary school data availability

Data Collection: Census

To secure as large a data set as possible, the researcher collected data by census. Census data collection occurs when investigations attempt to collect data from the entire population. Therefore, the researcher targeted all New Jersey high schools that are in the A, B, and CD District Factor Groups. A, B, and CD school districts are considered the lowest socioeconomically by the New Jersey Department of Education due to the classification of District Factor Groupings (NJDOE, n.d.a). District Factor Groups were originally developed in the mid 1970s as a vehicle for comparing student performance on statewide assessments across school districts with similar demographics (New Jersey Department of Education, n.d.a). The method for determining what DFG a school district is classified into derives from six variables that are closely related to socioeconomic status (New Jersey Department of Education, n.d.): (a) Percent of adults with no high school diploma; (b) Percent of adults with some college education; (c) Occupational status; (d) Unemployment rate; (e) Percent of individuals in poverty; and (f) Median family income. Since their inception, DFG classifications have also been utilized in other ways such as to determine *Abbott* school status. Every 10 years, DFGs are reclassified by using census data from the United States Census Bureau.

Table 2 depicts the available population for the census. To determine the public high schools available for data collection, all high school level assessment data were downloaded from the New Jersey Department of Education assessment database (2009a) into a data set. The data were sorted by district factor groupings. The analysis found 324 high schools (grade 9-12, non-vocational, non-charter). Also, Table 2 also depicts disaggregated number of high schools and students found for each district factor

grouping. The table indicates that there were 49 high schools in the A District Factor Group, 39 in the B District Factor Group, and 29 high schools in the CD District Factor Group. In 2009, the number of students in each of the lowest socioeconomic groupings ranged from 8,292 to 12,175, totaling 31.3% of all students in the state taking the HSPA.

Table 2

District Factor Groups (2009)

DFG	High Schools (n)	Students in D.FG taking HSPA ^a	% of Total Population
A	49	12,175	13.0
B	39	8,925	9.5
CD	29	8,292	8.8
DE	51	14,622	15.6
FG	44	12,032	12.8
GH	56	18,448	19.7
I	47	15,439	16.5
J	12	3,698	3.9

Source: New Jersey Department of Education 2009 HSPA Summary, NJDOE (2010).

^a approximate number of students enrolled (Language Arts and Math students differ but are close in number)

Instrumentation

Data from five different sources were used for this investigation. Three of the sources were downloaded from archived databases: the New Jersey School Report Card, Electronic Violence and Vandalism Reporting System, and the New Jersey High School Proficiency Assessment database (2007 dataset). However, there were no pre-existing

datasets that described curriculum quality or facility quality. To attain the data needed for this investigation, the researcher developed surveys from other surveys that were previously constructed. Survey research allows researchers to describe the perceptions of various stakeholders associated with the study (Berends, 2006).

Survey Design

Three surveys were found and adapted for the purposes of this study. The curriculum quality instrument was adapted (with permission from Pearson Education) within Tanner and Tanner (2007) *Best Practice Checklist for Curriculum Improvement and School Renewal*. Twenty six of the 119 total questions in the checklist were selected as related to the research from the review of the literature describing curriculum quality. Questions were then filtered to meet two other criteria. The first was that the questions needed to be administratively mutable at the school level. Second, the questions needed to reflect aspects of curriculum quality that were practical to high schools.

To develop a survey instrument for facility quality, the researcher found two currently used survey instruments that had parts that aligned to the literature review. The two facility survey instruments were the Wisconsin School Facility Survey and The School Building Assessment Survey developed by Sanoff, Pasalar, and Hashas (2001). Designed and employed by the Wisconsin Department of Public Instruction, by statute [Section 115.33(4)], periodically all schools in Wisconsin take the Wisconsin School Facility Survey (1999). The researcher found and utilized 16 of the 90 total questions, which were supported by the research connecting school facilities and student achievement. To complete the facility quality survey, the researcher added 10 questions

form the School Building Assessment Survey (Sanoff et al., 1999). Questions also were accepted after alignment to the research by also being administratively mutable at the school level, and reflecting practicality to the high school.

Two separate surveys were then combined into one survey for investigation of the research questions and hypotheses. Reliability and validity reports, or instrument construction reports were not available for all three of the surveys. Therefore, the researcher implemented a pilot study to validate the survey and determine the reliability of the instrument.

Pilot Study

A pilot study of the survey instruments was deployed on a small scale to validate the survey instrument, as well as determine the reliability of the question subsets. Pilot studies allow researchers to employ surveys to small samples to study and revise the procedures and questions for a larger study on a small-scale of participants (Berends, 2006; Litwin, 1995). During the winter of 2008, a survey consisting of 50 (24 curriculum quality and 26 facility quality) questions were administered to 15 participants, each with an educational background, 7 with master's degrees, and 6 with doctoral degrees. The surveys were administered on line using a survey engine from www.surveymonkey.com. Following the completion the surveys, each respondent completed a feedback form with various questions on matters such as the amount time to take survey, wording, quality of questions and responses, depth of questions and responses, and readability.

Pilot respondents indicated that the length of time for the survey was appropriate and the questions were of high quality. Participants also responded that the questions in

the survey were all associated with the variables of interest. Nine of the curriculum quality questions were considered very dense and hard to read. These questions were unpacked and wording was changed to improve readability. Then repetitive questions were eliminated leaving 21 curriculum quality questions. Of the 26 facility quality questions, respondents identified that six of the questions were very similar to content other questions were asking for. These questions were clarified and revised.

A second deployment of additional reviewers was made with the same protocols as originally deployed. Sixteen participants answered the second deployment of the pilot (8 doctorate, 8 masters level respondents). Of the 23 curriculum quality questions; all of the questions were validated as acceptable. Three comments on wording were considered. One question was changed. Of the 26 facility quality questions, three of the questions were suggested as too close to other questions. The researcher considered the three questions, concurred with the respondents and the questions were dropped. This left a total of 23 facility quality questions for deployment in the main study.

Reliability

Reliability is a measure to determine how reproducible the survey data are (Litwin, 1995). Even though both surveys were constructed prior to this study, no technical information revealing reliability coefficients for the surveys were available. Therefore, the researcher tested the internal consistency for both surveys to ensure the appropriate reliability. To determine the reliability of both sections of the survey instrument, a Cronbach's alpha test of internal consistency was utilized using SPSS from the data collected during the pilot study (Cronbach, 1951). Minimum Cronbach's alphas

of at least .70 or higher were considered as reliable measurements (Nunnally & Bernstein, 1994).

Pilot results for internal consistency in each of the sub scales for curriculum quality was high. The Cronbach's Alpha coefficient for curriculum design was .835, curriculum development, .859, and forces that influence curriculum was .804. A test for internal consistency was also conducted for facility quality. For the physical facility, the Cronbach's reliability coefficient was .722. For the learning environment sub scale the coefficient was .766. The technology sub scale was .924 and safety was a .888. Again, the internal consistency for each of the sub scales was in the acceptable range as noted in the literature.

Variables

Independent Variables

Curriculum quality. The curriculum quality instrument had a total of 21 questions, with three subsets of questions. Curriculum quality had eight questions, followed by six questions that focused on curriculum development. The last subset of questions, focused on forces of curriculum that might influence achievement. All of the questions in each of the three subsets had a 4-point summated rating scale (strongly in evidence, some evidence, little or no evidence, evidence to the contrary). Each question was scored from 1 to 4. A 1 represented a low or poor score and 4 an excellent or high score. For each subset, adding together the points from each of the questions attained an overall score.

Facility quality. The facility quality instrument had a combination of 23 questions, consisting of four components. Each respondent was asked six questions regarding the physical environment, seven questions focusing on the learning environment, five questions about the high school's technology, and five questions pertaining to the degree of safety and security of the facility. The physical construction, learning environment, and technology subsets each had a 5-point summated rating scale (very satisfactory, satisfactory, neither, unsatisfactory, very unsatisfactory). The subset for safety and security had a similar 5-point summated rating scale (always, usually, about half the time, seldom, never). Each question was scored from 1 to 5. A 1 represents a low or poor score and 5 an excellent or high score. For each subset, adding together the points from each of the questions attained an overall score.

Non-curricular school-level variables that influence instruction. Non-curricular school-level variables that influence instruction were collected from the archived New Jersey Department of Education School Report Card database: <http://education.state.nj.us/rc/rc08/index.html>. All school level data that were administratively mutable and suggested by the review of the literature were downloaded. These variables were either continuous or categorical data. The data included the number of special education students, average class size, the number of conditional certifications on staff, number of highly qualified teachers, student/faculty ratio, Internet connectivity, student/computer ratio, and instructional time. Also, the percentage of students on free and reduced lunch and the school enrollments were also downloaded from the New Jersey Report Card database.

School safety. School safety data were downloaded from the New Jersey Department of Education's database on incidents of violence and vandalism (NJDOE, 2008e). Data reported for incidents of violence, vandalism, substance abuse, and weapons are uploaded from at the school and district level each year through the Electronic Violence and Vandalism Reporting System (EVVRS). There are several types of incidents nested within each of the overall categories. Bullying, indicated in the review of the literature as possibly related to student achievement, is part of the violence category but was an additional category used in this study. Five categories of overall incidents were used for the school study variable: violence, vandalism, substance abuse, weapons, and bullying.

Dependent Variables

High School Proficiency Assessment (HSPA). The High School Proficiency Assessment (HSPA) is the statewide assessment that measures student achievement at the high school level in New Jersey. All first time 11th grade students take the HSPA and all students in New Jersey must pass the HSPA to graduate from high school. In 1996 the New Jersey State Board of Education adopted the New Jersey Core Curriculum Content Standards setting benchmarks for what students should be able to master at each grade level (New Jersey Department of Education, 2006). The HSPA is given each year to measure student attainment toward student benchmarks in language arts literacy, mathematics and science.

The 2007 HSPA contained three sections, of which two were used to construct the dependent variables (language arts literacy and mathematics). The language arts literacy

assessment of the HSPA contained assessment items to gauge content mastery in reading and writing. The reading section consisted of two passages (narrative and persuasive). Each passage varied in length from 2,100 words (narrative text) and 3,300 words (persuasive text) (NJDOE, 2008a). Both passages contained ten multiple-choice questions and two open-ended questions. The multiple-choice questions were worth 1 raw score point and the open-ended question were worth 4 points each (2008a). In addition to the reading questions were two writing prompts (1 picture and 1 speculative). Both writing responses were scored on the 6-point New Jersey Holistic Scoring Rubric (2008a) (picture prompt is worth 6 raw score points and the speculative prompt is worth 12 points). Overall, the 2007 Language Arts Literacy assessment was worth 54 raw score points (NJDOE, 2008a). To attain a passing score on the HSPA in 2007, a high school student needed to collect 24 out of 54 raw score points or a 44.4%.

The Mathematics assessment of the High School Proficiency Assessment (HSPA) measured student achievement on four mathematics content standards. A total of 30 multiple choice and 6 open-ended questions (48 total points) assessed students' knowledge of mathematics in number and numerical operations, geometry and measurement, patterns and algebra, and data analysis, probability and discrete mathematics (NJDOE, 2008a). Within each of these content areas were strands focusing on specific subsets of mathematics, such as geometric properties and coordinate geometry (geometry and measurement). Each multiple-choice question counted as one point each (total of 30 points). Open-ended questions (6) counted as 3 points each and were scored using the New Jersey Open Ended Math Scoring Rubric (total of 18 points). In 2007, to

achieve a passing score on the Mathematics section of the HSPA, students needed to collect at least 20.5 raw score points out of 48 total raw score points, or 42.7%.

Raw scores were converted to scale scores that ranged from 100-300. A high school's student proficiency rate is determined by how many students attain partially proficient, proficient, and advanced proficient on the HSPA. Students who score below 200 (100-199) were classified as partially proficient. Students who achieved a scale score of 200-249 were considered proficient and any scale score from 250-300 was advanced proficient.

Data Collection

A combination of both survey and archived data were collected for this investigation. First, the researcher downloaded all high school level achievement data from the 2007-archived New Jersey High School Proficiency Assessment database into Microsoft Excel. All scale scores for language arts literacy and mathematics were entered into columns and all other data were deleted. All of the schools were given unique codes (080001, 080002, etc.), which would be used to match the downloaded data to survey data later. Next, New Jersey Report Card Data (2006-2007) (NJDOE, 2008d) were downloaded and matched to the assessment data by school. Column data were entered for the number of special education students, average class size, the number of conditional certifications on staff, number of highly qualified teachers, student/faculty ratio, Internet connectivity, student/computer ratio, instructional time, percentage of students on free and reduced lunch and school enrollments. Subsequently, once the data for the HSPA and the New Jersey School Report Card were entered and cleaned, the

researcher manually found each low socioeconomic high school in the 2007 New Jersey School Violence and Vandalism Database (NJDOE, 2008d) and entered the total number of incidents reported into the main database for violence, vandalism, substance abuse, weapons, and bullying. All data were cleaned, organized, and labeled for easy conversion to SPSS.

To collect the survey data on curricular and facility quality, the researcher conducted a census of leaders of lower socioeconomic high schools in New Jersey. First, the researcher contacted school leaders by sending an electronic letter of consent and a letter of participation to every school leader with knowledge of the curriculum and the facility (see Appendix E). The letter briefly described the study, asked for his/her (or a fellow school leader in the school's) consent and timely participation in taking the survey, and provided a link to the on line survey instrument. Participants that were willing to participate either mailed or faxed a completed consent form to the researcher.

The first attempt yielded 24 participants in the study. After 2 weeks, the researcher sent a follow up e-mail to the original letter. The researcher also called school leaders directly following the follow up e-mail. Following this attempt, 30 respondents completed the survey bring the total number of respondents to 54. After 2 more weeks, the researcher again sent e-mails and called school leaders. At the end of 9 weeks of data collection, the researcher had 72 respondents but only 71 of the 72 completed surveys. Several follow attempts to procure participation from the 72nd case were made, but all were unsuccessful.

Respondents who completed and returned their letter of consent were electronically provided an enabled link via e-mail to a survey website (secure and

encrypted). To protect the anonymity of the respondents, each respondent's electronic survey was provided a numbered code. No respondent needed to enter his or her name, or his or her school. As respondents completed their surveys, the researcher downloaded the results into the main database, and matched the unique school codes between the two databases.

Once the final database was constructed, unique identifiers were added to replace high school names. Completing such a process assures that no school was identified in this study to anyone outside of the researcher. When the schools' surveys were successfully linked to the published data in the main database, the researcher destroyed all survey information that would connect the schools to the data. Therefore, minimal risk to human subjects was achieved (Federal Policy 45 CFR 46.102(i)).

All data were then exported into SPSS and standardized to *Z* scores. This step was taken to ensure that data distributions were normal, as the types of data in the variable of interest varied greatly. *Z* scores or normal scores allow the researcher to compare different variables with different meanings on the same scale. For instance, it would be difficult to compare total time in school and number of special education students in a factor analysis without standardizing these variables first.

Missing Data

A census of 117 lower socioeconomic high schools was conducted to procure data for this study. To control for missing data the researcher considered several different statistical methods (listwise deletion, pairwise deletion, mean imputation, regression imputation). The researcher utilized maximum likelihood estimation to obtain estimates

of model parameters (Allison, 2001). The goal of maximum likelihood estimation is to identify the population parameter values most likely to have produced a particular sample of data (Peugh & Enders, 2004). Such a statistical method can be used in conjunction with other statistical analysis such as regression analysis and yields estimates based on the model of fit that most likely represents the data presented in the data set. During the data collection, there were no cases that had incomplete data in both the curriculum quality and facility quality portions of the surveys as well as the downloaded data.

Data Analysis

The first step in the data analysis was to extract descriptive statistic, and to organize and summarize the important characteristics of the sample and variables involved in the study (Slavin, 2007). The descriptive analysis investigated the frequencies (sample, independent and dependent variables), the measures of central tendency (mean, median, mode) and measures of variability (variance and standard deviation). Subsequently, the data were analyzed to provide deeper explanation of the findings.

Following the descriptive analysis, an investigation was conducted by employing multiple regression analysis to test the four hypotheses identified in this study (Curriculum quality; Non-curricular school-level variables that influence instruction; Facility quality; School safety).

Statistical power analysis

Statistical power analyses can be done before or after data collection. Prior to data collection, the main purpose of conducting a power analysis is to determine the appropriate sample size for rejecting a null hypothesis if the null hypothesis is false. A researcher wants to know what the chances are of correctly rejecting a null hypothesis when the null hypothesis is false. After data collection, the main purpose of conducting a power analysis may be to determine the chances of having correctly rejected a false null hypothesis provided a sample of a certain size, a certain coefficient of determination or R^2 , and a certain p-value such as .01 or .05 for rejecting the null hypothesis. Cohen (1988) suggested the adequate statistical power coefficient should be .80 or above. A series of power analyses conducted after the data collection (post hoc), using an on-line power calculator for this purpose, indicated power levels of .8 and higher for all multiple regression models reported in Chapter IV.

Hypotheses

The following hypotheses were tested using data from 71 lower socioeconomic high schools in New Jersey.

Hypothesis 1(H1)

Curriculum quality is related to high school proficiency in language arts literacy and mathematics, given that curriculum quality, language arts literacy, and mathematics will be measured as continuous variables. Four dimensions of curriculum quality treated as independent variables were correlated with high school language arts literacy and

mathematics as dependent variables. The percent of students that receive free and reduced lunch were added as a control variable. The researcher developed a regression analysis to test each of the equations as follows:

$$1. \text{ HSPALAL} = b_0 + b_1 \text{CURRDES} + b_2 \text{CURRDEV} + b_3 \text{CURRFOR} + b_4 \text{PCTFARL} + e$$

$$2. \text{ HSPAMAT} = b_0 + b_1 \text{CURRDES} + b_2 \text{CURRDEV} + b_3 \text{CURRFOR} + b_4 \text{PCTFARL} + e$$

Hypothesis 2 (H2)

Instructional contexts are related to high school proficiency in language arts literacy and mathematics, where instructional contexts refers to the following independent variables: average class size, percent of teachers with conditional certificates, percent of highly qualified teachers, student-faculty ratio, internet connectivity, student-computer ratio, total instructional time, and faculty attendance rate. Dependent variables utilized were language arts literacy and mathematics. The percent of students that receive free and reduced lunch were added as a control variable. The researcher developed a regression analysis to test the basic equations as follows:

$$1. \text{ HSPALAL} = b_0 + b_1 \text{INSPED} + b_2 + \text{AVGCLSZ} + b_3 \text{CONDCER} + b_4 \text{PERCHQT} +$$

$$b_5 \text{STUFACR} + b_6 \text{INTCONN} + b_7 \text{STCOMPR} + b_8 \text{TOTINST} + b_9 \text{PCTFACL} + e$$

$$2. \text{ HSPAMAT} = b_0 + b_1 \text{INSPED} + b_2 + \text{AVGCLSZ} + b_3 \text{CONDCER} + b_4 \text{PERCHQT} +$$

$$b_5 \text{STUFACR} + b_6 \text{INTCONN} + b_7 \text{STCOMPR} + b_8 \text{TOTINST} + b_9 \text{PCTFACL} + e$$

Hypothesis 3 (H3)

Facilities including condition of the physical plant, the adequacy of learning environment, technology, and school security are related to high school proficiency in

language arts literacy and mathematics. An aggregate index variable was included for total facility quality. The researcher developed a regression analysis to test the basic equations as follows:

$$1. \quad HSPALAL = b_0 + b_1PHYSENV + b_2LEARENV + b_3TECHNOL + b_4SECURIT + b_5FACINDX + e$$

$$2. \quad HSPAMAT = b_0 + b_1PHYSENV + b_2LEARENV + b_3TECHNOL + b_4SECURIT + b_5FACINDX + e$$

Hypothesis 4 (H4)

School safety is related to high school proficiency in language arts literacy and mathematics. School safety refers to incidents of violence, vandalism, substances, weapons, and bullying and will be measured by sub-scales of data reported by high schools yearly. The researcher developed a regression analysis to test the basic equations as follows:

$$1. \quad HSPALAL = b_0 + b_1INCVIOL + b_2INCVAND + b_3INCSUBS + b_4INCWEAP + b_5INCBULL + e$$

$$2. \quad HSPAMAT = b_0 + b_1INCVIOL + b_2INCVAND + b_3INCSUBS + b_4INCWEAP + b_5INCBULL + e$$

Culminating Research Question

The proposed research led to a culminating research question regarding a model for student achievement, explained by a combination of significant predictors of

curriculum quality, quality of instruction, facility quality, and school safety. What was the best model for student achievement predicted by a combination of the significant variables of interest (curriculum quality; non-curricular school-level variables that influence instruction; facility quality; school safety) toward higher student achievement? Principal components analysis was utilized to examine a model for best fit between the multiple variables nested in each of the four independent variables that related to student achievement. This exploratory task was undertaken to guide and frame additional research on this topic.

In SPSS, data from the significant predictors were reduced using principal components analysis with a varimax solution to identify hidden relationships within the multiple independent variables. PCA first provided descriptive statistics describe the mean, standard deviation and the number of cases among the relationships in the factor analysis. A correlation matrix was created to illustrate the relationships between the variables, as well as identify if any variables are too highly associated with one another, as this would suggest that the questions were too closely related and variables may need to be combined. Maximum eigenvalues were set at 1.0, as recommended, to explain the variances of the principal components toward the total variance (Comrey & Lee, 1992). During the analysis, the three assumptions for principal components analysis were conducted. The first test of assumptions was to find whether the determinant in the correlation matrix was above zero, meaning that a solution could be attained. Next, the test for a high enough Kaiser-Meyer-Olkin (KMO) was conducted, indicating large enough sample size and that enough items were predicated by each factor. And third, the Bartlett test of correlation was conducted to provide a reasonable basis for factor analysis

to be conducted. Scree plots provided pictorial representation of the eigenvalues to further explain the plot of the Varimax solution. From the eigenvalue results and the scree plot, the number of principal components were selected and identified. The rotated matrix described what specific principal components could be reduced to assemble new variables.

Limitations

One limitation of this study was the use of correlation research, which describes relationships, not cause. While correlation designs might provide insight into explaining what might influence student achievement in high schools, true experimental designs would provide a more rigorous test of causal hypotheses (Gall et al., 2003). Correlation between two variables does not necessarily imply that one causes the other (Slavin, 2007). The purpose of this study was to determine if the proximal variables curriculum quality, non-curricular school-level variables that influence instruction, facility quality and school safety influence student achievement in New Jersey lower socioeconomic high schools. Creating an experimental design that allows researchers to experiment with these variables would be costly and nearly impossible with the different approaches that would be needed.

Another limitation in this investigation is that while the active variables included in this study are important parts of high schools in New Jersey (as outlined in NJ QSAC), other variables may also influence student achievement. That is, implying that improving the facility might influence student achievement without considering spurious correlations (Slavin, 2007) or lurking variables (Gall et al., 2003) that might contribute to

the relationship is a limitation. For instance, the survey instruments in this study consider four measures of curriculum quality, however Collective Teacher Efficacy (Goddard et al., 2000) might influence curriculum quality indirectly.

The data sets for this study are also a limitation. One specific data set is that the study that might be a limitation is in school violence and crime. While the data has recently become more reliable with the addition of new laws that provide a structure for reporting and checking data, the data are still self-reported by schools. While there are stiff penalties for school administrators, superintendents, and school board members for reporting false data, there have been no specific examples where some schools are held accountable for falsely reporting data on school violence and crime. Further, other researchers have noted methodological barriers associated with measuring school safety (Cornell & Mayer, 2010; Gottfredson, Czeh, Cantor, Crosse, & Hantman, 2000; Randazzo, 2006; Sharkey, Furlong, & Yetter, 2006) and the current data collection process that the New Jersey Department of Education utilized may be flawed or present data with methodological weaknesses.

The validity and reliability of NJ statewide assessment data in mathematics and language arts literacy have been rarely documented. Nonetheless, researchers suggest that reliability coefficients remain higher than .70 (Nunnally & Bernstein, 1994; Streiner, 2003). The technical manuals for the HSPA indicate that some data clusters do not have high reliability coefficients (NJDOE, 2006). Therefore, it is with caution that this study understands and utilizes data derived from statewide assessments.

Finally, an important limitation of this study was the small number of cases that were available for investigation. New Jersey is generally an affluent state. Only 19.3%

of the high schools were classified as lower socioeconomic high schools (117 out of 606 total high schools in A, B, and CD DFG). For instance, statisticians suggest a sample size greater than 200 for varimax rotations using principal components analysis to be stable (Comrey & Lee, 1992). There were 71 cases in this study, far fewer than the limits suggested by experts. Therefore, strong caution was used when making assumptions from the findings from this study.

Summary

The purpose of this study was to investigate how high school leaders in lower socioeconomic high schools might set organizational conditions proximal to students in certain ways that promote higher student achievement despite the challenging pressures that schools now confront. A sample was drawn from the targeted population (census) of 117 lower socioeconomic public high schools in the state of New Jersey. 71 high schools responded and participated in this research. The survey data were matched to archive data, cleaned and exported electronically to SPSS. Next, regression analysis was used to test four hypotheses and the relationships between and among all active variables in the study. Following the four regressions, significant predictors were reduced using principal components analysis to determine whether a model of best fit could be established to inform future research. The results are reported in Chapter IV of this study.

CHAPTER IV

FINDINGS

Four research questions were stated to search for relationships between four different proximal variables (curriculum quality, instructional quality, facility quality, and school safety), and student achievement among contextually lower socioeconomic status high schools in New Jersey. The questions separately examined these relationships using a multiple regression approach with a conceptual framework grounded in the literature. The fifth and culminating research question required a search for a single multi-dimensional model using factor analysis to explore overlap among the first four questions. Chapter IV begins with a description of the sample.

Description of the Sample

A census was conducted of the 117 lower socioeconomic high schools in New Jersey: district factor groups A, B, and CD school districts. Of the 117 lower socioeconomic high schools, a total of 71 high schools responded and fully completed the survey on both curriculum and facility quality. Table 3 shows the demographics of the 71 responding schools. The mean enrollment was 1,200 students, with a standard deviation of 686.5. Approximately half of the students (50.3%) were eligible for free or reduced-price lunch. Thirty-two high schools were located in the lowest socioeconomic category, DFG A. Their mean student enrollment was 1,213 students, with a standard deviation of

724.4. Among schools in DFG A, the mean percent of students eligible for free or reduced lunch was 69.3. Sixteen high schools responded to the survey from the B district factor grouping. The mean enrollment size in the sample of high schools was nearly the same at 1,104 students, with a standard deviation of 528.6. Forty one percent of the students in DFG B were on free or reduced lunch. Finally, 23 high schools responded from the CD district factor grouping. Among the 23 high schools in CD, the mean student enrollment was 1,248, with a standard deviation of 748.6. The poverty rate was 30.2% of the students on free or reduced lunch. Enrollment sizes varied widely within each DFG with standard deviations between 528.6 and 724.4. Schools in DFG B were somewhat smaller on average than schools in the other DFGs, with somewhat less variability in size.

Table 3

Description of the Sample

DFG	<i>n</i>	Enrollment (Mean)	SD	% F/R Lunch
(Mean)				
A	32	1,213	724.4	69.3
B	16	1,104	528.6	41.5
CD	23	1,248	748.6	30.2
Total	71	1,200	686.5	50.3

Variable List

The variable list in Table 4 includes names and labels for the two dependent variables, student achievement scale scores in language arts literacy and mathematics. Also, four sets of independent variables are listed under curriculum quality: non-curricular school-level variables that influence instruction, facility quality, school safety, and other.

Table 4 also denotes the range associated with each variable. The High School Achievement Assessment (HSSA) scores, for example, varied in language arts literacy from 158.4 to 242.1, and varied in mathematics from 161.5 to 242.5.

Under curriculum quality, three subcategories are listed. The possible range for curriculum design was 13 through 32, curriculum development was 10 through 26, and forces that influence the curriculum the range varied from 12 through 33. Eight non-curricular school-level variables that influence instruction subcategories and their individual ranges are also listed. The subcategories and their spreads were the percentage of special education students (2.2-115.1), average class size (10.12-29.4), percentage of teachers with conditional certifications (0.0-14.0), percentage of teachers who were highly qualified (69.0-100.0), student to faculty ratio (5.13-20.12), number of computers that were connected to the Internet (60.0-1382.0), student to computer ratio (.71-15.21), and total instructional time (4.0-6.49). Facility quality included four subcategories with labels. The ranges for each of the subcategories were 12 through 30 for the physical environment, 14 through 35 for the learning environment, 5 through 25 for technology and the range for school safety and security was 5 through 25. Five subcategories and their ranges were listed for school safety. The spread for the number of incidents of

violence was between 0 and 70. The total number of incidents for vandalism ranged from 0 and 28, substance abuse 0 and 21, and weapons were 0 and 34. Finally, the number of incidents in bullying varied from 0 to 12.

Description of Variables

Table 5 presents descriptive statistics pertinent to most, if not all, items on the preceding variable list. Data collected from 71 lower socioeconomic high schools were collected without any missing data for each subcategory.

The data collected from 71 lower socioeconomic high schools on the two dependent variables, High School Achievement Assessment achievement in language arts literacy and mathematics, mean scale scores differed from 212.53 to 204.77, respectively. The variances of the data were similar with language arts literacy having a standard deviation of 14.67 and mathematics 15.41.

Curriculum quality had three subcategories, of which the data collected through the survey instrument yielded a complete set of non-standardized data for the 71 high schools. For the first subcategory, there were 32.0 possible points associated with curriculum design. The mean of the responses was 24.66, and the variance was 4.99. Curriculum development had a total of 24.0 possible points associated with the subcategory, and the mean response was 19.0 and the variance was 3.84. Finally for the subcategory named forces influencing the curriculum, the mean response was 22.82 out of a total of 28.0 points possible, with a standard deviation of 5.82.

Table 4

Variable List

Construct/Variable Name	Variable Description	Range
<u>Achievement</u>		
HSPALAL	Language arts literacy	158.40 – 242.10
HSPAMAT	Mathematics	161.50 – 242.50
<u>Curriculum Quality</u>		
CURRDES	Curriculum design	13 - 32
CURRDEV	Curriculum development	10 - 26
CURRFOR	Curriculum forces	12 - 33
<u>Non-Curricular School-Level Variables That Influence Instruction</u>		
NSPECED	Number of special education students	2.20 – 115.10
AVGCLSZ	Average class size	10.12 – 29.40
CONDCER	% teachers, conditional certification	0.00 – 14.00
PERCHQT	% highly qualified teachers	69.00 – 100.00
STUFACR	Student to faculty ratio	5.13 – 20.12
INTCONN	Internet connectivity	60.0 – 1382.0
STCOMPR	Student to computer ratio	0.71 – 15.21
TOTINST	Total instructional time	4.00 – 6.49
<u>Facility Quality</u>		
PHYSENV	Physical environment	12 - 30
LEARENV	Learning environment	14 - 35
TECHNOL	Technology	5 - 25
SECURIT	Safety and security	5 - 25
<u>School Safety</u>		
INCVIOL	Incidents of violence	0 - 70
INCVAND	Incidents of vandalism	0 - 28
INCSUBS	Incidents of substances	0 - 21
INCWEAP	Incidents of weapons	0 – 34
INCBULL	Incidents of bullying	0 – 12
<u>Other Variables</u>		
STUENRL	Total Student Enrollment	232.0 – 3397.0
PCTFARL	Percentage Free/Reduced Lunch	18.6 – 92.7

Also listed in Table 5 are eight variables associated with non-curricular school-level variables that influence that collected without any missing data ($n=71$). In the sample of data, the average percentage of special education students was 17.88, but had a standard deviation of 12.75 indicating wide variability within the different high schools. Average class sizes were more consistent, with a mean of 19.18 students per classroom. The standard deviation was 3.67. The mean percentage of teachers with conditional certifications in lower socioeconomic high schools was 0.66%, with a variance of 2.11. Most high schools had nearly 100% of their teachers listed as highly qualified, with the average of 98.2, with a standard deviation of 4.26. The mean student to faculty ratio was 10.91, with a variance of 2.19. While the mean ratio of students per computer was 3.69, and the variance was rather small at 2.34, the average number of computers connected to the Internet was 353 per high school, and the variability was much larger, with a standard deviation of 236. Finally, total instructional time was rather consistent with a mean of 5.7 hours per day, and a standard deviation of .50 hours.

Facility quality for the 71 lower socioeconomic high schools is also shown in Table 5. Four subcategories were associated with facility quality. For the physical environment survey, there were 6 questions that yielded a total of 30.0 possible points. The mean response was 21.59 and the standard deviation was 4.88. For the learning environment subcategory, out of a possible 35.0 points, the mean was 23.24, with a similar variance of 5.4. There were 25 total points possible in the technology subcategory, with a relatively low mean of 15.82, and a larger standard deviation of 5.89. Finally the school security subcategory had a high mean of 18.59 out of 25 possible

points, and the variance was 4.48, indicating that most high schools facilities had high levels of security and safety.

School safety was indicated by five subcategories of misbehavior: violence, vandalism, substance abuse, weapons, and bullying. The subcategory with the highest average of incidents was violence, which the mean number was 17.04 incidents, and varied widely among the lower socioeconomic high schools with a standard deviation of 18.1 incidents. Incidents of vandalism and weapons had similar results. Weapons incidents averaged 5.76 per school with a variance of 7.44. Vandalism incidents had an average of 4.1 incidents per high school and a smaller standard deviation than weapons incidents at 5.7. On average, lower socioeconomic high schools only had 2.16 incidents of substance abuse (SD 3.15) and 1.35 incidents of bullying (SD 2.45).

The average enrollment in the sample of 71 lower socioeconomic high schools was 1,199.85 students and the standard deviation was quite large at 686.53 students. The average percent of students on free and reduced lunch in these high schools was 50.35, a number that also had a large variance of 21.26 percent.

Reliability

Although the pilot study found that both the survey instruments for curriculum quality and facility quality were reliable with minimum Cronbach alphas, once the study was conducted, Cronbach's test of internal consistency was conducted to recalculate reliability of the variables. As previously noted, minimum recommended alpha coefficients are .70 or higher (Nunnally & Bernstein, 1994, Streiner, 2003). Appendix C notes the internal consistency scales for both the curriculum quality and

Table 5

Description of Variables

Variable Name	<i>n</i>	Mean	SD
<u>High School Achievement Assessment</u>			
HSPALAL	71	212.53	14.67
HSPAMAT	71	204.77	15.41
<u>Curriculum Quality</u>			
CURRDES	71	24.66	4.99
CURRDEV	71	19.00	3.64
CURRFOR	71	22.82	5.82
<u>Non-Curricular School-Level Variables That Influence Instruction</u>			
NSPECED	71	17.88	12.75
AVGCLSZ	71	19.18	3.67
CONDCER	71	0.66	2.11
PERCHQT	71	98.20	4.26
STUFACR	71	10.91	2.19
INTCONN	71	353.0	236.0
STCOMPR	71	3.69	2.34
TOTINST	71	5.70	0.50
<u>Facility Quality</u>			
PHYSENV	71	21.59	4.88
LEARENV	71	23.24	5.40
TECHNOL	71	15.82	5.89
SECURIT	71	18.59	4.48
<u>School Safety</u>			
INCVIOL	71	17.04	18.10
INCVAND	71	4.10	5.70
INCSUBS	71	2.16	3.15
INCWEAP	71	5.76	7.44
INCBULL	71	1.35	2.45
<u>Other Variables</u>			
STUENRL	71	1199.85	686.53
PCTFARL	71	50.35	21.26

facility quality surveys in this study. Internal consistency for each of the subscales for curriculum quality was high. The Cronbach's Alpha coefficient for curriculum design was .890, curriculum development, .829, and forces that influence curriculum was .873. A test for internal consistency was also conducted for facility quality. For the physical facility, the Cronbach's reliability coefficient was .797. For the learning environment subscale the coefficient was .770. The technology subscale was .883 and safety was a .771. Again, the internal consistency for each of the subscales was in the acceptable range as noted in the literature.

Research Question 1

The first research question examined the relationship between curriculum quality and language arts and mathematics achievement. All values were standardized into z scores to assure normal distribution. As the majority of students in the sample were eligible for free and reduced lunch, the language arts achievement scores and curriculum variables almost certainly do not represent the state high schools in general. The relevant correlation coefficients are presented in Table 6. As anticipated, the correlation coefficients for both curriculum design ($r = .35, p < .01$) and curriculum development ($r = .32, p < .01$) were significantly related to language arts achievement. Also, the correlation between language arts achievement and antecedents was significantly negative ($r = -.24, p < .05$). The correlation achievement and poverty was strongly negative ($r = -.64, p < .01$), as expected.

Table 7 shows the simultaneous multiple regression results for student achievement in language arts literacy and curriculum quality. The percent of students

eligible for free and reduced lunch was included as a control variable. The table shows that all three of the predictors accounted for 50% ($R^2 = .50$, $p < .01$) of the variance on language arts literacy scores [$F(4,66) = 16.20$]. This is considered a large effect size (Cohen, 1988) and suggests that curriculum quality is a strong predictor of language arts literacy achievement.

Table 6

Correlations for HSPA Language Arts Literacy and Curriculum Quality (n=71)

<i>Variable</i>	<i>1</i>	<i>2</i>	<i>3</i>	<i>4</i>
HSPALAL	.35**	.32**	-.24*	-.61**
Predictors				
1. CURRDES	-	.72	.43	-.43
2. CURRDEV		-	.43	-.28
3. CURRFOR			-	.04
4. PCTFARL				-

Note. * $p < .05$; ** $p < .01$; ns = not significant, $R^2 = .50$

The Pearson Correlation for curriculum design and mathematics achievement on the HSPA was significant at .39 ($p < .05$), as shown in Table 8. The correlation between curriculum development and mathematics was also significant at .34 ($p < .05$). No

significant relationship was found, however, between the forces that influence the curriculum and HSPA mathematics achievement.

Table 7

Multiple Regression Analysis Summary for Curriculum Quality and HSPA LAL (n=71)

Variable	<i>B</i>	<i>SEB</i>	β
CURRDES		.14	.37
CURRDEV		.13	.28
CURRFOR		.10	-.51
PCTFARL		.10	-.45
Constant	-1.62	.09	

Note. $R^2=.50$; $F(4,66)=16.20$, $p<.001$

The same multiple regression procedure was utilized to examine the relationship between curriculum quality and mathematics student achievement on the HSPA. The percent of students on free and reduced lunch was again included as a control variable, as shown in Table 9. Once again, all values were standardized into *z* scores. The R squared value for the model was .50, demonstrating that 50% of the variance in math achievement was explained [$F(4,66) = 16.40$]. Similarly to HSPA language arts literacy achievement, a negative and significant correlation ($r = -.61$) was found between percent of students on free and reduced lunch and HSPA mathematics achievement ($p < .001$). Again, the result of the model suggests a reasonable account of high school mathematics achievement.

Table 8

Correlations for HSPA Mathematics and Curriculum Quality (n=71)

<i>Variable</i>	<i>1</i>	<i>2</i>	<i>3</i>	<i>4</i>
HSPAMAT	.39*	.34*	-.18	-.63**
Predictors				
1. CURRDES	-	.72	.43	-.43
2. CURRDEV		-	.43	-.30
3. CURRFOR			-	.04
4. PCTFARL				-

*p<.05; **p<.01; ns = not significant, R²=.50

Both sets of correlation and regression tables indicate that curriculum quality likely matters in HSPA student achievement in language arts and mathematics. As the literature review suggested, curriculum quality, proximal to student achievement, was significantly related to achievement on the HSPA in language arts and mathematics. Nearly all of the independent sub-scales, except for curriculum forces and language arts literacy were significantly related to achievement. While the forces that influence curriculum were significantly and negatively related to language arts literacy, the same relationship could not be explained in mathematics. Notwithstanding that curriculum antecedents may matter more in this sample to language arts literacy than towards mathematics achievement, perhaps this is connected to the individual characteristics of

such forces that influence the curriculum, such as the textbook, individual content standards, or how the standards are aligned to the HSPA in mathematics.

Table 9

Multiple Regression Analysis Summary: Curriculum Quality and HSPA Mathematics (n=71)

Variable	<i>B</i>	<i>SEB</i>	β
CURRDES		.14	.18
CURRDEV		.13	.21
CURRFOR		.10	-.33
PCTFARL		.10	-.47
Constant	-1.61	.09	

Note. $R^2=.50$; $F(4,66)=16.40$, $p<.001$ * $p<.01$

Research Question 2

The second research question investigated the relationship between instructional quality and language arts and mathematics achievement on the High School Achievement Assessment in lower socioeconomic high schools in New Jersey. Instructional quality variables derived from the New Jersey School Report Card Database. The hypothesis established from the review of the literature suggested that instructional contexts are related to high school achievement in language arts literacy and mathematics. Instructional contexts were described as the number of special education students, average class size, percent of teachers with conditional certificates, percent of highly

qualified teachers, student-faculty ratio, Internet connectivity, student-computer ratio and total instructional time. Similarly to the regression models associated with curriculum quality, the percentage of students on free and reduced lunch was added as a control variable, and all values were standardized to z scores to assure normal distributions.

Table 10 shows correlations among language arts literacy achievement on the HSPA and various non-curricular school-level variables that influence instruction. Five of the nine variables had no significant relationship with language arts achievement [number of special education students ($r = -.04$, ns), average class size ($-.04$, ns), percent of conditional certifications ($r = -.16$, ns), student to faculty ratio ($r = .18$, ns), and number of computers connected to the Internet ($r = -.12$, ns)]. The relationship between HSPA language arts and percent of highly qualified teachers was significant ($r = .37$, $p < .01$), indicating that schools who have highly qualified teachers are likely to have stronger language arts achievement. Student to computer ratio also correlated significantly with language arts achievement. However, while positively correlated, the influence is negative as the result demonstrates that classrooms having fewer computers per student may likely have stronger the achievement in language arts. Finally, total instructional time was negatively correlated with achievement in language arts literacy ($r = -.32$, $p = .01$). Parallel to the curriculum quality model, language arts literacy achievement was negatively related to the percent of students on free and reduced lunch.

The nine variables were simultaneously regressed with language arts literacy achievement and the results are summarized in Table 11. The regression model included the eight independent measures of instructional quality and the control variable, which was the percent of students on free and reduced lunch.

Table 10

Correlations for HSPA LAL and Non-Curricular School-Level Instructional Variables (n=71)

Variable	1	2	3	4	5	6	7	8	9
HSPALAL	-.04	-.04	-.16	.37**	.18	-.12	.20*	-.32**	-.61**
Predictors									
1. NSPECED	-	.04	.07	-.12	.08	-.09	.47	.17	.02
2. AVGCLSZ		-	-.02	-.11	.46	.24	.26	.17	.09
3. CONDCER			-	-.36	.01	.04	-.13	-.01	-.04
4. PERCHQT				-	.18	-.72	1.7	-.22	-.33**
5. STUFACR					-	-.01	.34	-.05	-.30*
6. INTCONN						-	-.38	.04	-.29
7. STCOMPR							-	-.01	.20
8. TOTINST								-	-.17
9. PCTFARL									-

**p<.01; *p<.05; ns = not significant, R²=.44

The model had a large effect (Cohen, 1988) with an R squared value of .44 [$F(9,61) = 5.23$]. The table shows that 44% of the variance of language arts achievement on the HSPA is accounted for by the instructional quality predictors.

A parallel analysis was conducted for mathematics achievement and non-curricular school-level instructional predictors, as shown in Table 12. Again, the percentage of students on free and reduced lunch was included in the model and as expected, was negatively correlated ($r = -.63$) with mathematics scores on the HSPA ($p < .01$).

Table 11

Multiple Regression Analysis Summary: Non-Curricular School-Level Instructional Variables that Influence Instruction and HSPA LAL (n=71)

Variable	<i>B</i>	<i>SEB</i>	β
NSPECED		.12	-.034
AVGCLSZ		.13	.25
CONDCER		.11	-.13
PERCHQT		.12	.11
STUFACR		.12	-.44
INTCONN		.12	.33
STCOMPR		.14	.11
TOTINST		.11	-.12
PCTFARL		.11	-.54
Constant	-1.30	.10	

Note. $F(9,61)=5.23$; $p<.001$; $*p<.01$; $R^2=.44$

Similarly to language arts literacy, a majority of the variables did not correlate with mathematics achievement [percentage of special education students (-.17, ns), average class size (.01, ns), conditional certification (-.20), internet connectivity (-.07), student to computer ratio (.16, ns), and total instructional time (-.30)]. Mathematics achievement was significantly correlated with the percentage of teachers who were highly qualified ($r = .35, p < .01$), as well as the student to faculty ratio ($r = .22, p < .05$).

The continuation of the analysis is shown in Table 13, which notes the multiple regression analysis for mathematics achievement and school-level instructional quality antecedents. While the table shows that 46% of the variance [$F(9,61) = 5.86, R^2 = .46$] could be explained by the model, only two of the predictors indicated that achievement was significantly related to higher achievement (percentage of highly qualified teachers and student to faculty ratio), and as expected percentage of students on free and reduced lunch. Again, this result was a large effect size (Cohen, 1988).

Both models associated with the qualities of non-curricular school-level instructional quality variables correlated with language arts literacy and mathematics achievement. However, only one variable, the percentage of highly qualified teachers appeared to have a positive relationship with achievement. A negative relationship existed between instructional time in language arts literacy and higher achievement, as well as the larger the student to faculty ratios, the higher the HSPA scores in mathematics were. Notwithstanding these results, there are many reasonable reasons for increasing instructional quality. However, with few variables significantly correlated with language arts literacy or mathematics achievement, theory would suggest that some of the instructional quality antecedents included in the school report card are distal variables

and perhaps other variables associated with instructional quality exist which were not included in the analysis.

Table 12

Correlations for HSPA Mathematics and Non-Curricular School-Level Instructional Variables (n=71)

<i>Variable</i>	<i>1</i>	<i>2</i>	<i>3</i>	<i>4</i>	<i>5</i>	<i>6</i>	<i>7</i>	<i>8</i>	<i>9</i>
HSPAMAT	-.07	.01	-.20	.35**	.22*	-.07	.16	-.30	-.63**
Predictors									
1. NSPECED	-	.04	.07	-.12	.08	-.09	.47	.17	.02
2. AVGCLSZ		-	-.02	-.11	.46	.24	.26	.17	.09
3. CONDCER			-	-.36	.01	.04	-.13	-.01	-.04
4. PERCHQT				-	.18	-.72	1.7	-.22	-.33**
5. STUFACR					-	-.01	.34	-.05	-.29*
6. INTCONN						-	-.38	.04	.20
7. STCOMPR							-	-.01	-.17
8. TOTINST								-	.33**
9. PCTFARL									-

**p<.01; *p<.05; ns = not significant, R²=.46

Table 13

Multiple Regression Analysis Summary: Non-Curricular School-Level Instructional Variables and HSPA Mathematics (n=71)

Variable	<i>B</i>	<i>SEB</i>	β
NSPECED		.11	-.04
AVGCLSZ		.12	.06
CONDCER		.10	-.19
PERCHQT		.11	.07
STUFACR		.12	-.01
INTCONN		.11	.07
STCOMPR		.14	.06
TOTINST		.10	-.09
PCTFARL		.11	-.59
Constant	6.86	.09	

Note. $F(9,61)=5.86$, $p<.001$; $R^2=.46$

Research Question 3

The third research question investigated the relationship between facility quality and HSPA achievement in language arts literacy and mathematics. The review of the literature suggested that facility quality influences student achievement. Four independent variables for facility quality (physical environment, learning environment, technology, security), as well as an overall index for all of the facility variables were utilized in the analyses. Assumptions of linearity and uncorrelated errors were checked

and confirmed. Again, to meet the assumption for normal curve error, all values were standardized into z scores.

As information in Table 14 shows, language arts literacy was unrelated to an overall index of facilities quality composed of the other four sub-scales: physical environment, learning environment, technology environment, and security ($r = .08$, ns). Language arts literacy was uncorrelated with quality of the physical environment ($r = .01$, ns), uncorrelated with quality of the technology environment ($r = .18$, ns), and with quality of the security environment ($r = -.16$, ns). Needless to say there are many good and legitimate reasons for devoting resources to the quality of various internal high-school environments. Such reasons may include protecting student health, ensuring discipline and safety, and promoting the comfort of teachers and students. However, the correlation coefficient for language arts literacy with the measured quality of the learning environment was positive and significant ($r = .25$, $p < .05$). Language arts literacy correlates with the quality of learning environments, in particular, though not with the qualities of other measured internal environments in general.

Table 15 shows a continuation of the analysis of language arts literacy scores with the quality of facilities. A multiple regression model was designed to include quality measures of the four facility environments at once. In this model, language arts literacy scores were regressed simultaneously on all five predictors including a composite index of the other four. The table shows that although the predictors accounted for 24% of the variance on language arts literacy scores ($R^2 = .24$, $p < .01$), no single predictor stood out above the others as significant.

Table 14

Correlations for HSPA Language Arts Literacy and Facility Quality (n=71)

<i>Variable</i>	<i>1</i>	<i>2</i>	<i>3</i>	<i>4</i>	<i>5</i>
HSPALAL	.01	.25*	.18	-.16	.08
Predictors					
1. PHYSENV	-	.75	.46	.41	.78
2. LEARENV		-	.76	.48	.90
3. TECHNOL			-	.70	.88
4. SECURIT				-	.78
5. FACINDX					-

Note. **p<.01; *p<.05; ns = not significant, R²=.24

The results show that facilities quality likely matters to language arts literacy test scores, in general, despite the lack of significance for individual sub-scales. The quality of measured facilities or something associated with it does appear to make a difference to language arts literacy. Yet the method cannot tell us more about the likely explanation for the overall result. Theory would suggest only that facilities, except for learning environments (in particular), might be relatively distal to teaching and learning.

These results are mixed because only two of the four quality measures were uncorrelated with math achievement. The quality of facilities, then, appears to have a closer association with math achievement than with language arts literacy by a slim margin. In Table 17, as with language arts literacy, when math achievement was regressed on all five measures of facilities quality the resulting multiple regression model

was significant overall ($R^2 = .20$, $p < .05$). The reasons why investing in the quality of facilities are important go beyond academics, as mentioned before. Although no particular measures of facilities quality stood out as significant above the others in the regression model, the pair-wise correlations suggested that learning environments and technology both might share a positive relationship with math achievement.

Table 15

Multiple Regression Analysis Summary: HSPA Language Arts Literacy and Facility quality (n=71)

Variable	<i>B</i>	<i>SEB</i>	β
PHYSENV		.40	-.74
LEARENV		.41	-.72
TECHNOL		.45	-.19
SECURIT		.25	-.94
FACINDEX		.25	1.57
Constant	-1.93	.11	

Note. $F(4, 66)=5.25$, $p<.001$; $*p<.01$; $R^2=.24$

Research Question 4

The fourth research question examined the relationship between school safety and student achievement on the HSPA in lower socioeconomic high schools in New Jersey (language arts literacy and mathematics). School safety was defined by five variables of

interest: incidents of violence, incidents of vandalism, incidents of substance abuse, incidents of weapons, and incidents of bullying.

Table 16

Correlations for HSPA Mathematics and Facility quality (n=71)

<i>Variable</i>	<i>1</i>	<i>2</i>	<i>3</i>	<i>4</i>	<i>5</i>
HSPAMAT	.08	.32**	.27*	-.09	.17
Predictors					
1. PHYSENV	-	.75	.46	.41	.77
2. LEARENV		-	.78	.48	.90
3. TECHNOL			-	.70	.88
4. SECURIT				-	.78
5. FACINDX					-

**p<.01; *p<.05; ns = not significant, R²=.20;

A sixth composite variable was also added to the analysis. The review of the literature suggested that a relationship existed between school safety and student achievement. Values for each of the predictors were standardized using a variable conversion to *z* scores to assure normal distribution and regressed with both of the dependent variables, language arts literacy and mathematics achievement.

Data in Table 18 shows that language arts literacy achievement on the HSPA was not correlated with the overall composite index variable, which was composed of five subscales, including incidents of violence, incidents of vandalism, incidents of substance abuse, incidents of weapons, and incidents of bullying ($r = -.08$, ns). No relationships existed between language arts literacy and incidents of violence ($r = -.02$, ns), incidents of vandalism ($r = -.10$, ns), incidents of substance abuse ($r = -.19$, ns), incidents of weapons ($r = .07$), and incidents of bullying ($r = -.04$).

Table 17

Multiple Regression Analysis Summary: Facility quality and HSPA Mathematics (n=71)

Variable	<i>B</i>	<i>SEB</i>	β
PHYSENV		.40	-.65
LEARENV		.45	-.08
TECHNOL		.45	-.07
SECURIT		.25	-.87
FACINDX		.25	1.43
Constant	-5.50	.11	

Note. $F(4, 66)=5.46$, $p<.001$ * $p<.01$; $R^2=.20$;

A continuation of the analysis of language arts literacy scores with the characteristics of school safety is shown in Table 19. A multiple regression model

included each of the five qualities of school safety at once. Each of the achievement values was regressed simultaneously on all five predictors and the composite index. The table illustrates that the predictors accounted for only 7% of the variance of language arts scores.

Table 18

Correlations for HSPA Language Arts Literacy and School Safety (n=71)

<i>Variable</i>	<i>1</i>	<i>2</i>	<i>3</i>	<i>4</i>	<i>5</i>	<i>6</i>
HSPALAL	-.02	-.10	-.19	.07	-.04	-.08
Predictors						
1. INCVIOL	-	.62	.40	.38	.61	.80
2. INCVAND		-	.43	.41	.45	.82
3. INCSUBS			-	.31	.42	-.19
4. INCWEAP				-	.21	.07
5. INCBULL					-	-.38
6. VVINDEX						-

**p<.01; *p<.05; ns = not significant, R²=.07;

Cohen (1988) described this as a minimally small effect. Although the review of the literature suggested that school safety matters to achievement, in this model the results did not show that the composite or individual measures of school safety made a

difference to language arts literacy. One explanation may be that under normal circumstances school safety variables may be more distal to student achievement in mathematics and language arts literacy in particular than conventional wisdom suggests, though it would be inappropriate to claim that any non-significant predictor is by definition distal instead of proximal.

Table 19

Multiple Regression Analysis Summary: School Safety and HSPA LAL (n=71)

Variable	<i>B</i>	<i>SEB</i>	β
INCVIOL		.26	-.19
INCVAND		.28	-.20
INCSUBS		.23	-.30
INCWEAP		.24	.09
INCBULL		.16	.04
VVINDEX		.17	.21
Constant	-1.23	.119	

Note. $F(5, 65)=0.92$; $R^2=.07$

Table 20 shows the correlations between achievement in mathematics on the HSPA and measures of school safety. In the same manner as language arts literacy, most of the correlation coefficients were not significantly related to achievement in

mathematics. For example, the only variable that was related to achievement in mathematics was incidents of substance abuse ($r = -.21$, $p < .05$). Incidents of violence ($r = -.01$, ns), incidents of vandalism ($r = -.06$), incidents of weapons ($r = .08$, ns), incidents of bullying ($r = -.00$), as well as the composite index variable ($r = -.07$) were all not significantly correlated with achievement in mathematics.

Table 20

Correlations for HSPA Mathematics and School Safety (n=71)

<i>Variable</i>	<i>1</i>	<i>2</i>	<i>3</i>	<i>4</i>	<i>5</i>	<i>6</i>
HSPAMAT	-.01	-.06	-.21*	.08	-.00	-.07
Predictors						
1. INCVIOL	-	.62	.38	.38	.61	.80
2. INCVAND		-	.43	.41	.45	.82
3. INCSUBS			-	.31	.42	.71
4. INCWEAP				-	.31	.70
5. INCBULL					-	.56
6. VVINDEX						-

** $p < .01$; * $p < .05$; ns = not significant, $R^2 = .08$

The results from the simultaneous multiple regression model for school safety and mathematics achievement are described in Table 21. As with language arts literacy,

when achievement in mathematics was regressed on all six measures of school safety, the model was not significant ($R^2 = .08$), only explaining 8% of the variance in mathematics achievement.

Table 21

Multiple Regression Analysis Summary: School Safety and HSPA Mathematics (n=71)

Variable	<i>B</i>	<i>SEB</i>	β
INCVIOL		.28	-.06
INCVAND		.23	-.05
INCSUBS		-.29	-.29
INCWEAP		.23	.15
INCBULL		.16	.10
VVINDX		.18	.03
Constant	2.28	.19	

Note. $F(5, 65)=1.06$; $R^2=.08$

When language arts literacy and mathematics achievement were both simultaneously regressed against the index and independent measures of schools safety, the result indicated two models with minimal effect sizes (Cohen, 1988). While suggested in the literature as proximal to student learning, school safety appears to be

distal to student learning based on the results of this study or the data may contain other issues inherent in the dataset.

Research Question 5

A culminating research question examined if a model for student achievement could be predicted by a combination of significant predictors of the four variables of interest. During multiple regression analyses, six variables were correlated with achievement. These six variables were identified as curriculum design, curriculum development, forces that influence the curriculum, the percent of highly qualified teachers, learning environment, and technology as a function of the facility. Using SPSS, the researcher conducted a post-hoc principal components analysis with varimax rotation using the six predictors of student achievement to determine a model of best fit.

Importantly, because of the limited number of observations in the study ($n=71$), careful attention was given when testing the assumptions for an acceptable model for reduction. According to research (Leech et al., 2008), the assumptions needed for an appropriate model must contain independent sampling, normal curve, linear relationships among the variables. As previously mentioned, there are three standard checks of assumptions which protect the researcher from misrepresenting findings: an acceptable determinant in the correlation matrix (>0.00), the Kaiser-Mayer-Olkin (KMO) ($>.70$), and the Bartlett test of Sphericity ($>.05$).

Assumption testing was conducted during principal components analysis. The Bartlett's Test of Sphericity was conducted to test the correlations of the variables. The result indicated a coefficient less than .05 (approximate Chi-Square=642.3, $df=190$) at

.00, suggesting that the model is significantly different from an identity matrix, in which correlations between variables are all zero (Tucker & McCallum, 1997). The KMO coefficient was .63, which according to researchers (Leech et al., 2008; Tucker & McCallum, 1997) a minimum value of .70 should be attained, indicating sufficient items for each factor. The KMO measure of sampling adequacy was not adequate. Therefore, the assumptions for the principal components analysis were not met. Given the inadequacy of the data, principal components analysis did not reveal any new underlying factors that would contribute to explaining variations in student achievement for technical reasons.

CHAPTER V

DISCUSSION

The analysis of secondary achievement by four broad clusters of variables revealed consistently strong relationships between achievement and various predictors of achievement. Few school report card variables were associated with secondary student achievement. The measured attributes of the physical environment were not related to student achievement. However, the learning environment was positively related to student achievement. Though previous suggested that school safety is an issue in schools, the researcher found little evidence of a strong association between school safety and achievement. When schools emphasized curriculum design and development, students demonstrated higher levels of achievement in both language arts literacy and mathematics.

As expected, a facility's learning environment, that is the environment specifically designed for teaching and learning, was related to higher student achievement. Survey data indicated that learning areas meet students' educational needs, have appropriate technical components for instruction and learning such as lighting and acoustics, and are designed for working, planning and collaboration. Although previous findings suggest learning environments are important to student achievement (Crook, 2006; Edwards, 2006; Keller, 2007), this study amplifies previous studies by specifically finding relationships between the learning environment and its strategic importance for

achievement. Previous findings focused on the teacher efficacy based on using the learning environment for pedagogy (Keller, 2007) and specific environmental conditions and their impact on achievement (Crook, 2006; Edwards, 2006). Affirming the findings of Wang and colleagues (1993), the learning environment appears to be proximal to student achievement.

This study also was the first to organize facilities literature into different areas focused on achievement. By using the literature as a guide and improving on previous studies' methodologies (Picus et al., 2005), the current study found that although some parts of the facility are important to learning and student success, some might not be as important. Facility attributes that directly focus on student learning in the classroom appear to be proximal to achievement, while some are distal. These findings suggest when upgrading or building facilities, the difference between proximal and distal facility quality variables should be considered, as their influence on learning are different.

Differences in providing digital technology as measured by the number of computers and their Internet connectivity in classrooms did not appear related to differences in student achievement. However, in the facility quality survey, technology as a function of the facility correlated with mathematics achievement. This finding amplifies previous findings suggesting that the quantity of technology alone is not a factor in achievement, but other attributes (e.g., using technology as an instructional tool) make technology proximal to the learner (Kaffer, 2006; Ngo, 2006). Therefore, high school leaders should weigh the proximal reasons for why specific technologies are needed within the learning environment to support the teaching and learning process as this might relate to higher achievement (e.g., using broadband to foster student and

teacher for learning, presenting more efficient learning systems for teachers and students by using modern technologies to enhance instruction).

Surprisingly, average class sizes and lower student to faculty ratios were unrelated to student achievement. While recent research suggests that these school-level size variables may matter to high school student achievement (Bryk et al., 1993; Marzano et al., 2001; Nicholas, 2004; Rice, 1999) the findings from this research did not support these previous studies. Reducing average class sizes and student to teacher ratios seem practical toward personalizing learning and increasing the frequency of interactions with students (Marzano et al., 2001). This study, however, did not find any relationship between average class size or faculty to student ratios and achievement. Average class sizes, as well as faculty to student ratio are statistics that have inherent flaws that might have clouded the findings. Average class size infers that each class is the same size. At the school level, researchers who utilize the School Report Card archived data have no idea whether some classes are thirty students and some are ten. Further research might provide better data that describes both indicators of size and their relationship, if any, to achievement.

An unexpected finding was that total instructional time negatively correlated with language arts literacy student achievement. While researchers have argued whether or not increasing instructional time impacts student achievement (Berliner, 1990; Cox, 2007; Crotteau, 2002; Karweit, 1985; Karweit & Slavin, 1982; Levin & Tsang, 1987; Tobin, 1987), the findings in this study indicate that increasing instructional time negatively influences student achievement. This finding is counterintuitive and not

consistent with other research. The result is considered spurious and perhaps a lurking variable exists which was not considered in this study but has contributed to this finding.

One school report card variable that proved to be a strong predictor of student achievement was the percent of highly qualified teachers in a high school. Other studies also demonstrate the importance of teacher content knowledge at the high school level (Cain, 2009; Sparks, 2004; White, 2007), especially in lower socioeconomic areas (Heck, 2007). Specifically, higher concentrations of teachers in poorer areas tend to have less training or embody less content knowledge than others, leading to lower achievement of the students (Darling-Hammond, 2000; Hill & Theule-Lubienski, 2007). While the intent of this study was not to describe the inequities of highly qualified teachers in lower socioeconomic high schools, the findings do support considering hiring practices that promote employing teachers that are highly trained in content knowledge. Trajectories in both language arts literacy and mathematics and the findings in this study magnify the need for high schools to employ teachers with effective pedagogical skills, but who also have strong content knowledge.

Unexpectedly, findings from this study could not support a growing literature base that demonstrates school safety is related to higher student achievement (Brockenborough et al., 2002; Elliot et al., 1998; Gottfredson & Gottfredson, 2001; Lee, Smith, Petty & Smylie, 1999; Way, 2003). However, an important finding within the result was the low effect sizes yielded for both the language arts literacy and math regression models (R^2 .07, .08 respectively). A deeper examination of the data indicated possible flaws in the data collected and reported by the New Jersey Department of Education. For instance, researchers indicate that bullying is inherent in schools (Dinkes,

Cataldi, & Lin-Kelley, 2007; Mayer & Furlong, 2010), especially those in urban high schools (Dinkes, Kemp, & Baum, 2009), schools that are similar to many schools that participated in this study. The descriptive statistics described a mean number of incidents in lower socioeconomic high schools in one year as 1.35 incidents, whereas the range was 0-12 incidents. Clearly, this finding does not match other previous research or practical explanation. Further, the data are self reported and notwithstanding the improvements to data collection in recent years, it appears that the data may not be accurately reported. This suggests a possible issue regarding the face validity of the data; whereas the school violence and vandalism data do not actually measure the concepts it is supposed to be measuring. This finding also contributes local findings from New Jersey that amplify research describing the gap that exists between low-quality and high-quality data and methodology inherent within school safety research (Cornell & Mayer, 2010; Furlong & Sharkey, 2006; Mayer, 2006) and improved methods for understanding school safety and its importance to students and academic achievement (Cornell & Mayer, 2010; Mayer & Leone, 1999; Mayer, 2006).

Just as hypothesized, however, a cluster of three curriculum variables successfully predicted differences in student achievement. The findings on student achievement and curriculum were anticipated by, or at odds with, previous research. Curriculum design was the first of the three clusters that was significantly related to high school achievement. Previous studies indicated that quality curriculum designs, which contained democratic curriculum philosophies, goals and objectives (Aiken, 1942; Hlebowitsh, 1987; Presseisen, 1985; Tyler, 1949) which reflect the needs of the learner, identifies that the nature of knowledge is a fusion between content and experience, and acknowledges

that children develop differently (Tanner & Tanner, 2007). This study found high schools performed better when curriculum designs entailed these concepts. Further, the curriculum survey results suggested that although curriculum standards and assessments are mandated by statute, higher performing high schools exceeded the content standards by meeting the needs of the learners. This finding supports studies that indicated aligning curriculum to standards and assessment can be damaging because curriculum objectives become narrowed (Cresswell, 2004; English & Steffy, 2001; Reed, 2005; Tepper, 2002), standards may not be high quality or shift away from organizational goals (Lamb, 2007; Linn, 2003), curriculum focus on consolidating learning and thinking through a few courses (mental discipline) (Pederson, 2007; Reed, 2005), and the body of standards created might not be best (English & Papa, 2010). The robust findings of the analyses suggest that leaders consider curriculum design as a viable method for improving student achievement.

The process of curriculum development was also statistically significantly related to achievement. Studies conducted previously demonstrate the positive influence of the curriculum development process and increases in achievement and democracy (Aiken, 1942; Jacobs, 2004), especially in the construction of collaboration around student goals including achievement (Kercheval & Newbill, 2004; Tanner & Tanner, 2007; Wallace, 2001). Higher performing lower socioeconomic high schools in this study contained a curriculum system where teachers collaborated continuously. Professional staff was empowered to make decisions about materials and content, including articulation toward school goals using the curriculum as an avenue for growth. This amplifies recent studies that found the curriculum is an avenue to solve problems in the school and beyond

(Habegger, 2007; Jacobs, 2004; Surdin, 2007; Wilansky, 2006). The process of curriculum development is one that is proximal to students. When the high school embodies a system where curriculum is a common ground for teachers, stakeholders, leaders and the students, achievement appears to be higher.

The forces of curriculum were negatively correlated with student achievement. This indicates lower socioeconomic high schools that are influenced by forces such as mandates and assessment standards (i.e., distal) have lower student achievement. Results from previous studies demonstrate that distal forces such as standardization of content, process and product can encourage curriculum narrowing, standardized content which is not student or goal focused, and results in lower student achievement (Au, 2007; English & Papa, 2010; English & Steffy, 2001; Linn et al., 2002; Linn, 2003). This research amplifies these findings. High school achievement was higher in schools that used standardized tests as part, and not the end all of the curricular process. These schools balanced the curriculum and priorities of the school while mandates and standards called for standardization of the curriculum. Results indicated that higher achieving schools used multiple performance outcomes with several assessments given throughout the year. Therefore, high school leaders should be conscious of mandates and textbooks that may have a distal influence and influence achievement in a negative manner.

One final finding suggested that leadership in higher performing schools was important when connecting both curriculum design and development and student achievement. Survey questions inferred that there was a leader of the curriculum who mediated the design and development process. Previous research suggests that the principal and supervisor are important to such processes as distributing leadership and

balancing mandated initiatives and school goals (Bass & Avolio, 1994; Elmore, 2000; Habegger, 2007; Leithwood, 1994; Stein & D'Amico, 2002). This research specifically found that the leader of the curriculum is the mediating agent when balancing the different domains of the curriculum paradigm.

Implications for Practice

This study focused on what organizational conditions leaders in lower socioeconomic high schools might set to contribute to increases in the current achievement trajectories toward the 2014 NCLB mandate of 100% proficiency. Although a limitation of the study was the number of low SES high schools ($n = 71$) that participated in the study, this research is the first study to investigate these variables in New Jersey high schools. The results of this study are not meant to generalize to larger populations, but inform researchers and practitioners of the findings and implications given the lack of growth in high school achievement since 2002 (USDOE, 2010). Notwithstanding this limitation, the findings suggest four important implications for practice.

High school leaders should consider the importance of highly qualified teachers. This includes efforts to recruit highly qualified faculty for secondary positions, as well as providing further training of currently employed teachers who are not highly qualified. School districts should use personnel resources to ensure that recruits have majored in subject matters that they are hired to teach. The hiring of teachers that not only have sound pedagogical abilities but strong content knowledge may have an influence on student achievement, especially in New Jersey. This practice is easily addressed in the

employment of staff, and data are available that would promote this practice. Hill and Theule-Lubienski (2007) suggested that the disparity of highly qualified teachers in low SES high schools versus more affluent areas has a profound influence on learning. The results of this study demonstrate that increasing the percentage of highly qualified teachers may make a difference in lower SES schools.

School leaders may also consider using highly qualified teachers in the most deficient areas in their schools. For instance, if data in a high school indicate that special education students or English language learners are deficient in achievement, leaders might focus matching highly qualified teachers with these subgroups as these students many times qualify for several NCLB subgroups, as well as the total population scores.

Professional development is also a consideration for increasing the percentage of highly qualified teachers. High school leaders might decide to bring in content experts before pedagogical specialists to increase content knowledge of teachers. Higher performing low SES high schools may try innovative methods such as action research to increasing teacher content knowledge. Moreover, school leaders have the ability to mesh content professional development with the curriculum development process, which was a robust predictor of student achievement.

The findings of this research also indicate that school districts and school leaders should treat the learning environment as a key function of facility quality. The learning environment and technology were important facility design attributes when considering achievement. Improving the physical structure or security system compared poorly with putting digital technology into the hands of students in classrooms. Despite many practical reasons for improving the physical condition or appearance of the facility which

were suggested in previous studies, many aspects of facility quality are likely distal and far removed in schools from the everyday experiences of teaching learning.

Facility construction projects in New Jersey have drawn a lot of public media coverage in recent year, and new construction projects have been widely publicized. For instance, the New Jersey School Development Authority (SDA) reported on its website that since 1998, 10 billion dollars have been allocated to construction in local school districts for new construction or renovation projects. SDA also reports that many fabulous high schools have been built which have aesthetically pleasing designs, beautiful sporting facilities, and neon lighted signs in front of the school that scroll messages continuously. There are many good reasons, of course, to build new schools. Unfortunately, perhaps, the manner in which school construction has been tied to improved student learning seems unclear.

When reviewing previous research for purposes of this dissertation, the author found not one rigorous empirical study that focused on the direct or indirect impact of school facilities on achievement. This study improved research on some of the methodological flaws suggested by Picus and colleagues (2005) by using inferential statistics from survey data. Other studies that have utilized similar statistical methods for analysis have yielded stronger findings (Crook, 2006; Edwards, 2006; Keller, 2007). For the first time, this study also separated different constructs of the facility toward achievement and found that some facility components might be more important than others. Notwithstanding this finding, it is unreasonable to suggest that school leaders let their schools fall apart. However, during tight economic times, it may be important for schools that are working toward AYP to consider this finding. Regardless, with the given

limitation of this research, it is warranted that future research might improve the statistical methodologies and analyses of this study, as well as further contribute to what is known about the impact of the facility toward achievement.

Unpredictably, this study did not find a significant relationship between school safety and student achievement. Reasonably, school leaders and teachers would consider the importance of a safe and orderly learning environment. The lack of accurate data, such as the average number of bullying incidents in lower SES high schools is an validity issue, further underscoring a host of methodological issues found in previous studies (Cornell & Mayer, 2010; Furlong & Sharkey, 2006; Mayer, 2006). The data collected by the New Jersey Department of Education through the Electronic Violence and Vandalism, and Substance Abuse Incident Report System may be flawed therefore over or under representing an accurate understanding of what is occurring in schools with regard to safety. Importantly, school leaders, especially those in high schools painted as “persistently dangerous” should be aware of these findings as the data are used by New Jersey to implement the Unsafe School Choice Option of the No Child Left Behind Act (20 USC 7912). Since the onset of the No Child Left Behind Act of 2001, 7% of New Jersey’s lower socioeconomic high schools (8/117) have been deemed as “persistently dangerous” under the USSO (Davy, 2009).

The findings associated with the clusters associated with curriculum quality and student achievement were significant. The curriculum quality variables subsets (Curriculum Design, Curriculum Development, and Forces that Influence the Curriculum) were structured according to Tanner and Tanner’s (2007) description of the curriculum paradigm, as informed by previous researchers and empirical studies (Aiken,

1942; Dewey, 1902; 1938; Giles, McCutchen, & Zechiel. 1942; Smith & Tyler, 1942; Tyler, 1949; Wrightstone, 1935). High school leaders in lower socioeconomic areas should consider the importance of both curriculum design and curriculum development with regards to achievement.

With such robust findings, school leaders might focus on developing a symbiotic relationship between curriculum development and curriculum design. That is, use curriculum development as an ongoing process, where the design of the curriculum is the central focal point of teaching operations. Although other functions are important to high schools and teaching, easily curriculum design and development could be made the focal point of professional learning, budgeting, and strategic planning.

The results of this study also underscore the importance of the curriculum leader. Regardless of the position, (i.e., director of curriculum, principal, assistant principal, supervisor), the curriculum leader ensures that curriculum articulation and coordination are organized toward common goals while ensuring a heterogeneous population has an adequate education. Especially in lower SES high schools where achievement pressures are increased because of the lack of progress, the curriculum leader finds the development of the curriculum as an opportunity to increase achievement and other important school and student outcomes.

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APPENDIX A

Appendix A

Projected HSPA Achievement Trajectories

DFG	Content Area	2001- 2002	2008- 2009	Total Change	Rate/ Year	Projected 2014	Differen ce from 100%
A	Language Arts Literacy	56.5	57.7	+1.2	+0.17	58.6	-41.4
	Mathematics	34.7	41.4	+6.7	+0.96	46.2	-53.8
B	Language Arts Literacy	74.3	74.2	-.10	-0.01	73.7	-26.3
	Mathematics	59.9	60.1	+0.2	+0.03	60.2	-39.8
CD	Language Arts Literacy	79.7	80.4	+0.7	+0.1	80.9	-19.1
	Mathematics	63.3	66.5	+3.2	+0.46	68.8	-31.2
DE	Language Arts Literacy	84.3	85.3	+1.0+	+0.16	85.0	-15.0
	Mathematics	69.8	72.8	+3.0	+0.43	74.9	-25.1
FG	Language Arts Literacy	86.7	87.6	+0.9	+0.12	88.1	-11.9
	Mathematics	75.9	76.7	+0.8	+0.1	77.3	-22.7
GH	Language Arts Literacy	88.7	91.4	+2.7	+0.43	93.3	-6.7
	Mathematics	75.9	83.1	+7.2	+1.07	88.1	-11.9
I	Language Arts Literacy	94.2	94.4	+0.2	+0.0	94.4	-5.6
	Mathematics	88.9	88.4	-0.5	-0.1	88.0	-12.0
J	Language Arts Literacy	97.8	96.0	-1.8	-0.3	94.7	-5.3
	Mathematics	94.1	92.3	-1.8	-0.3	91.0	-9.0

Source: Tramaglini, T.W. (2010); New Jersey Department of Education (NJDOE).
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<http://www.nj.gov/education/schools/achievement/2009/hspa/>

APPENDIX B

<i>NCLB</i> /Title I School Improvement Continuum Chart Year	Status	Interventions for Title I Schools
Year 1	Early Warning – Did not make AYP for one year	None
Year 2	First year of school in need of improvement status. Did not make AYP for two consecutive years in the same content area.	Parent notification, public school choice (or supplemental educational services), school improvement plan, technical assistance from district.
Year 3	Second year of school in need of improvement status. Did not make AYP for three consecutive years in the same content area	Parent notification, public school choice, supplemental educational services, school improvement plan, technical assistance from the district
Year 4	Third year of school in need of improvement status – corrective action. Did not make AYP for four consecutive years in the same content area.	Parent notification, public school choice, supplemental educational services, school improvement plan, technical assistance from district and state, corrective action, participation in CAPA.
Year 5	Fourth year of school in need of improvement status – school restructuring plan. Did not make AYP for five consecutive years in the same content area.	Parent notification, public school choice, supplemental educational services, school improvement plan, technical assistance from district and state, development of restructuring plan (governance).
Year 6 and above	Fifth year of school in need of improvement status – implementation of restructuring plan. Did not make AYP for six consecutive years in the same content area.	Parent notification, public school choice, supplemental educational services, school improvement plan, technical assistance from district and state, implementation of restructuring plan.

Source: New Jersey Department of Education. (2009). No Child Left Behind Act of 2001: Reference Manual, Trenton, NJ: Author.

APPENDIX C

Survey Instrument Reliability (Cronbach's Alpha)

Internal Consistency for Curriculum Quality Survey (n=71)

Construct/Variable Name	Variable Description	<i>n</i> questions	α
Curriculum Design	CURRDES	8	.890
Curriculum Development	CURRDEV	6	.829
Curriculum Forces	CURRFOR	7	.873

Internal Consistency for Facility Quality Survey (n=71)

Construct/Variable Name	Variable Description	<i>n</i> questions	α
Physical Environment	PHYSENV	6	.797
Learning Environment	LEARNENV	7	.770
Technology	TECHNOL	5	.883
Safety and Security	SECURIT	5	.771

APPENDIX D

Instruments

Curriculum Quality

Curriculum Design

1. Adequate attention is given to scope and sequence of the total school curriculum.
 - a. Strongly in evidence
 - b. Some evidence
 - c. Little or no evidence
 - d. Evidence to the contrary
2. At the secondary level, the curriculum in general education is designed to meet the needs of a heterogeneous student population
 - a. Strongly in evidence
 - b. Some evidence
 - c. Little or no evidence
 - d. Evidence to the contrary
3. Curriculum articulation is developed horizontally (between and among subject fields) and vertically (from grade level to grade level and from school to school within the district).
 - a. Strongly in evidence
 - b. Some evidence
 - c. Little or no evidence
 - d. Evidence to the contrary

4. Statements of educational objectives emphasize the development of higher thinking abilities, in which facts and skills are put to meaningful use
 - a. Strongly in evidence
 - b. Some evidence
 - c. Little or no evidence
 - d. Evidence to the contrary
5. The professional staff gives concerted attention to the “general design” of the school curriculum.
 - a. Strongly in evidence
 - b. Some evidence
 - c. Little or no evidence
 - d. Evidence to the contrary
6. The design of the curriculum serves as a useful resource for lesson design and implementation
 - a. Strongly in evidence
 - b. Some evidence
 - c. Little or no evidence
 - d. Evidence to the contrary

7. Curriculum design is a reflection of a system that includes the voices of all teachers,
not just one curriculum writer
 - a. Strongly in evidence
 - b. Some evidence
 - c. Little or no evidence
 - d. Evidence to the contrary
8. The scope of all curriculum reflects goals and objectives beyond mandated core
curriculum content standards
 - a. Strongly in evidence
 - b. Some evidence
 - c. Little or no evidence
 - d. Evidence to the contrary

Curriculum Development

1. Teachers and supervisors under the leadership of the director of curriculum [or other
school leader] are engaged in continuous and systematic curriculum development
 - a. Strongly in evidence
 - b. Some evidence
 - c. Little or no evidence
 - d. Evidence to the contrary

2. The responsibility for the curriculum, including the selection and use of curricular materials, resides with the professional staff, not with any external source or special-interest group
 - a. Strongly in evidence
 - b. Some evidence
 - c. Little or no evidence
 - d. Evidence to the contrary
3. The [curriculum] committee is provided with the needed time for appropriate curriculum development
 - a. Strongly in evidence
 - b. Some evidence
 - c. Little or no evidence
 - d. Evidence to the contrary
4. A standing curriculum committee is in operation in the school, devoting its efforts to curriculum articulation and to the development of promising programs for educational improvement.
 - a. Strongly in evidence
 - b. Some evidence
 - c. Little or no evidence
 - d. Evidence to the contrary

5. Curriculum development is treated as a problem-solving process involving the entire professional staff of the school and the school district.
 - a. Strongly in evidence
 - b. Some evidence
 - c. Little or no evidence
 - d. Evidence to the contrary
6. Stakeholders such as students, parents and Board of Education members work with professional staff on curriculum development
 - a. Strongly in evidence
 - b. Some evidence
 - c. Little or no evidence
 - d. Evidence to the contrary

Forces That Influence Curriculum

1. Standardized tests are used appropriately and do not mitigate a balanced and rich curriculum
 - a. Strongly in evidence
 - b. Some evidence
 - c. Little or no evidence
 - d. Evidence to the contrary

2. The balance and coherence of the curriculum is maintained in the face of any special priorities that may be established for the school
 - a. Strongly in evidence
 - b. Some evidence
 - c. Little or no evidence
 - d. Evidence to the contrary
3. The textbook does not determine the course of study, but is used along with a rich variety of curricular materials, resources, and activities for productive learning.
 - a. Strongly in evidence
 - b. Some evidence
 - c. Little or no evidence
 - d. Evidence to the contrary
4. Standardized tests are used for diagnostic purposes, not for purposes of determining student grades or for segregating students into different classes.
 - a. Strongly in evidence
 - b. Some evidence
 - c. Little or no evidence
 - d. Evidence to the contrary

5. The curriculum is aligned to multiple performance outcomes, not just proficiency on statewide as
 - a. Strongly in evidence
 - b. Some evidence
 - c. Little or no evidence
 - d. Evidence to the contrary
6. Benchmark assessments are utilized several times per year to provide data that drives curriculum and instruction
 - a. Strongly in evidence
 - b. Some evidence
 - c. Little or no evidence
 - d. Evidence to the contrary
7. Results from student assessment of curricular goals on statewide assessments are utilized to place students in courses
 - a. Strongly in evidence
 - b. Some evidence
 - c. Little or no evidence
 - d. Evidence to the contrary

Facility Quality

Physical

1. The condition of the school interior is
 - a. Very Satisfactory
 - b. Satisfactory
 - c. Neither
 - d. Unsatisfactory
 - e. Very Unsatisfactory
2. The building is designed and built to the scale of high school students
 - a. Very Satisfactory
 - b. Satisfactory
 - c. Neither
 - d. Unsatisfactory
 - e. Very Unsatisfactory
3. The condition of the school exterior is
 - a. Very Satisfactory
 - b. Satisfactory
 - c. Neither
 - d. Unsatisfactory
 - e. Very Unsatisfactory

4. The school building is appropriate for learning at the high school level
 - a. Very Satisfactory
 - b. Satisfactory
 - c. Neither
 - d. Unsatisfactory
 - e. Very Unsatisfactory
5. The physical size of the school is
 - a. Very Satisfactory
 - b. Satisfactory
 - c. Neither
 - d. Unsatisfactory
 - e. Very Unsatisfactory
6. The physical size of the classrooms are
 - a. Very Satisfactory
 - b. Satisfactory
 - c. Neither
 - d. Unsatisfactory
 - e. Very Unsatisfactory

Learning Environments

1. Acoustics and noise levels in the school are
 - a. Very Satisfactory
 - b. Satisfactory
 - c. Neither
 - d. Unsatisfactory
 - e. Very Unsatisfactory
2. Lighting in classrooms is
 - a. Very Satisfactory
 - b. Satisfactory
 - c. Neither
 - d. Unsatisfactory
 - e. Very Unsatisfactory
3. Indoor areas are built to provide for individual learning needs
 - a. Very Satisfactory
 - b. Satisfactory
 - c. Neither
 - d. Unsatisfactory
 - e. Very Unsatisfactory

4. Areas for instruction of the sciences
 - a. Very Satisfactory
 - b. Satisfactory
 - c. Neither
 - d. Unsatisfactory
 - e. Very Unsatisfactory
5. Areas for instruction of the performing arts
 - a. Very Satisfactory
 - b. Satisfactory
 - c. Neither
 - d. Unsatisfactory
 - e. Very Unsatisfactory
6. Teachers workspaces provide for working, planning, and collaboration
 - a. Very Satisfactory
 - b. Satisfactory
 - c. Neither
 - d. Unsatisfactory
 - e. Very Unsatisfactory

7. Classroom walls are conducive to displaying student work

- a. Very Satisfactory
- b. Satisfactory
- c. Neither
- d. Unsatisfactory
- e. Very Unsatisfactory

Technology

1. Wireless and broadband internet connections foster student and teacher use of technology

- a. Very Satisfactory
- b. Satisfactory
- c. Neither
- d. Unsatisfactory
- e. Very Unsatisfactory

2. Learning areas that feature computer technology enhance learning situations for students

- a. Very Satisfactory
- b. Satisfactory
- c. Neither
- d. Unsatisfactory
- e. Very Unsatisfactory

3. Available classroom technology offers teachers ample opportunities to enhance instruction
 - a. Very Satisfactory
 - b. Satisfactory
 - c. Neither
 - d. Unsatisfactory
 - e. Very Unsatisfactory
4. Updated multimedia (DVD players, LCD projectors, etc.) is available in classrooms for teachers and students
 - a. Very Satisfactory
 - b. Satisfactory
 - c. Neither
 - d. Unsatisfactory
 - e. Very Unsatisfactory
5. Classroom computer placements are flexible and can allow teachers and students multiple arrangements for learning situations
 - a. Very Satisfactory
 - b. Satisfactory
 - c. Neither
 - d. Unsatisfactory
 - e. Very Unsatisfactory

Safety

1. The school facility is fitted with functional safety/security devices such as metal detectors, surveillance cameras, or protective glass
 - a. Always
 - b. Usually
 - c. About half of the time
 - d. Seldom
 - e. Never
2. In the event of a safety/security issue, the building can be safely locked down to deter threats
 - a. Always
 - b. Usually
 - c. About half of the time
 - d. Seldom
 - e. Never
3. The doors to the facility are closed and locked when students are present
 - a. Always
 - b. Usually
 - c. About half of the time
 - d. Seldom
 - e. Never

4. The doors of classrooms are closed and locked when students are present
 - a. Always
 - b. Usually
 - c. About half of the time
 - d. Seldom
 - e. Never
5. The design of the facility allows school staff members to monitor entrances
 - a. Always
 - b. Usually
 - c. About half of the time
 - d. Seldom
 - e. Never

APPENDIX E

Informed Consent Letter



Rutgers, The State University of New Jersey
Graduate School of Education
Thomas W. Tramaglini, Doctoral Candidate

Dear Research Participant:

The purpose of the current study is to better understand the relationships between curricular quality, non-curricular school-level variables that influence instruction, facility quality, and school safety and high school student achievement on the NJ HSPA. Utilizing the attached survey, the researcher will collect data focusing on two components of high school organizations: curriculum quality and facility quality. At least one member of the high school administrative team (e.g., respondent must hold a valid NJ Principal, Supervisor, or CSA certificate) with common knowledge of the curriculum and the facility should complete the survey. The combination of both sections of the survey should take approximately 15-20 minutes. The goal of the research is to better inform school leaders and researchers on organizational methods which may influence student achievement.

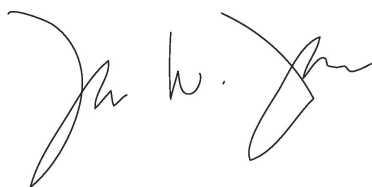
Your responses to the survey questions will be kept strictly confidential. Collected data responses will be placed into a secure database with password encryption. Once data is collected and secured, the researcher will link the data to publically reported data from the New Jersey Department of Education (School Report Card and New Jersey Violence and Vandalism Statistics) in the same database. Once the data is aggregated in a single file, the name of the high school will be given a unique identifier eliminating the identity of the high school altogether to assure confidentiality. No responses will be attributable to you in any written report.

Participation in this study is entirely voluntary. In addition, you are free to discontinue participation at any time, if you choose. If you have any questions about the procedures of this study, you may contact the principal investigator Thomas Tramaglini, by mail at 136 Riveredge Road, Tinton Falls, NJ 07724 or via e-mail at ttram@eden.rutgers.edu, or the dissertation advisor, Dr. James Bliss, 10 Seminary Place, New Brunswick, NJ 08901 or 732-932-7496.

If you have any questions about your rights as a research subject, you may contact the IRB Administrator at Rutgers University at: Rutgers University, the State University of New Jersey

Institutional Review Board for the Protection of Human Subjects, Office of Research and Sponsored Programs, 3 Rutgers Plaza, New Brunswick, NJ 08901-8559, Tel: 732-932-0150 ext. 2104, or e-mail: humansubjects@orsp.rutgers.edu.

Sincerely,

A handwritten signature in black ink, appearing to read 'Th. W. Tramaglini', with a stylized flourish at the end.

Thomas W. Tramaglini

() I have read the above description, and I voluntarily agree to become a participant in this study. Furthermore, I understand that I am free to discontinue participation at any time if I so choose.

Name: _____ Date: _____

Superintendent or Superintendent Designee

[SEND]

APPENDIX F

Research Participation Letter



Rutgers, The State University of New Jersey
Graduate School of Education
Thomas W. Tramaglini, Doctoral Candidate

Dear Research Participant:

The purpose of the current study is to better understand the relationships between curricular quality, non-curricular school-level variables that influence instruction, facility quality, and school safety and high school student achievement on the NJ HSPA. Utilizing the attached survey, the researcher will collect data focusing on two components of high school organizations: curriculum quality and facility quality. At least one member of the high school administrative team (e.g., respondent must hold a valid NJ Principal, Supervisor, or CSA certificate) with common knowledge of the curriculum and the facility should complete the survey. The combination of both sections of the survey should take approximately 15-20 minutes. The goal of the research is to better inform school leaders and researchers on organizational methods which may influence student achievement.

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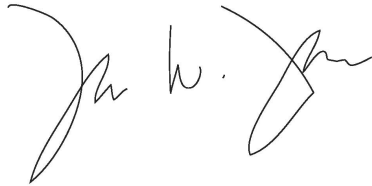
Participation in this study is entirely voluntary. In addition, you are free to discontinue participation at any time, if you choose. If you have any questions about the procedures of this study, you may contact the principal investigator Thomas Tramaglini, by mail at 136 Riveredge Road, Tinton Falls, NJ 07724 or via e-mail at ttram@eden.rutgers.edu, or the dissertation advisor, Dr. James Bliss, 10 Seminary Place, New Brunswick, NJ 08901 or 732-932-7496.

If you have any questions about your rights as a research subject, you may contact the IRB Administrator at Rutgers University at: Rutgers University, the State University of New Jersey

Institutional Review Board for the Protection of Human Subjects, Office of Research and Sponsored Programs, 3 Rutgers Plaza, New Brunswick, NJ 08901-8559, Tel: 732-932-0150 ext. 2104, or e-mail: humansubjects@orsp.rutgers.edu.

Please click on the following link to begin the survey.
Link – [INSERT LINK TO SURVEY INSTRUMENT HERE]

Sincerely,

A handwritten signature in black ink, appearing to read 'Th. W. Tramaglini', with a stylized flourish at the end.

Thomas W. Tramaglini